F-22 Operational Squadron and T-38 Detachment Beddown at Tyndall Air Force Base, Florida

Environmental Assessment

August 2011

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ACRONYMS AND ABBREVIATIONS

46 TW	46th Test Wing
µg/L	Micrograms per Liter
µg/m^3	Micrograms per Cubic Meter
325 FW	325th Fighter Wing
325 OSS/OSO	325th Operations Support Squadron Scheduling Office
53 WEG	53rd Weapons Evaluation Group
ACAM	Air Conformity Applicability Model
ACC	Air Combat Command
ACC/A5	Air Combat Command Plans and Programming Directorate
ACHP	Advisory Council on Historic Preservation
ACM	Asbestos-Containing Material
ACMI	Air Combat Maneuvering Instrumentation
AETC	Air Education Training Command
AETC/CE	Air Education Training Command/Civil Engineering
AFB	Air Force Base
AFEPPM	Air Force Energy Program Policy Memorandum
AFFF	Aqueous Film Forming Foam
AFI	Air Force Instruction
AFM	Air Force Manual
AFMC	Air Force Materiel Command
AFOSH	Air Force Occupational and Environmental Safety, Fire Protection, and Health
AGL	Above Ground Level
AHAS	Avian Hazard Advisory System
AICUZ	Air Installation Compatible Use Zones
AME	Alternate Mission Equipment
AMO	Asbestos Management and Operations Plan
ANG	Air National Guard
ANSI	American National Standards Institute
APE	Area of Potential Effect
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
AR	Attrition Reserve
ARTCC	Air Route Traffic Control Center
ASA	Acoustical Society of America
ASU	Airspace for Special Use
AT/FP	Anti-Terrorism/Force Protection
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
AWWTP	Advanced Wastewater Treatment Plant
BACT	Best Available Control Technology
BAI	Backup Assigned Inventory
BAM	Bird Avoidance Model
BASH	Bird/Wildlife Aircraft Strike Hazard
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CCCL	Coastal Construction Control Line
CE	Civil Engineering
CEANN	Asset Management Flight, Natural Resources Management Section
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CES	Civil Engineer Squadron
CEVN	Civil Engineer Environmental Flight, Natural Resources Element
CFA	Controlled Firing Areas
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CO_2e	Carbon Dioxide Equivalent
CONUS	Continental United States
CRM	Cultural Resource Management
CSAR	Combat Search and Rescue
CSE	Central Scheduling Enterprise
CSEL	C-Weighted Sound Exposure Level
CWA	Clean Water Act
CY	Calendar Year
CZ	Clear Zone
CZMA	Coastal Zone Management Act
db	Decibel
DDESB	Defense Department Explosives Safety Board
DMM	Discarded Military Munitions
DNL	Day–Night Average Sound Level
DoD	Department of Defense
EA	Environmental Assessment
ECP	Northwest Florida Beaches International Airport
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EGTTR	Eglin Gulf Test and Training Range
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EISA	Energy Interdependence and Security Act
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAC	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FL	Flight Level
FLAA	Florida "A" Air Traffic Control Assigned Airspace (ATCAA)
FNAI	Florida Natural Areas Inventory
FONPA	Finding of No Practicable Alternative
FTU	Formal Training Unit
FWC	Florida Fish and Wildlife Conservation Commission
FY	Fiscal Year
GBU	Guided Bomb Unit
GCEC	Gulf Coast Electric Cooperative
GHG	Greenhouse Gases
GIS	Geographic Information System
GPS	Global Positioning System
GRASI	Gulf Regional Airspace Strategic Initiative
ha	Hectares
HAP	High Accident Potential
HFCs	Hydrofluorocarbons
HWMP	Hazardous Waste Management Plan
Hz	Hertz
IAP	Initial Accumulation Point
ICRMP	Integrated Cultural Resource Management Plan
IICEP	Intergovernmental and Interagency Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
IPCC	Intergovernmental Panel on Climate Change
IRP	Installation Restoration Program
ISWM	Integrated Solid Waste Management Plan
ITC	Integrated Training Center
JBER	Joint Base Elmendorf-Richardson
JDAM	Joint Direct Attack Munition
JSF	Joint Strike Fighter
kHz	Kilohertz
km	Kilometer
km^2	Square Kilometers

ACRONYMS AND ABBREVIATIONS CONTINUE ON THE INSIDE OF THE BACK COVER

FINDING OF NO SIGNIFICANT IMPACT/ FINDING OF NO PRACTICABLE ALTERNATIVE

NAME OF PROPOSED ACTION - F-22 Operational Squadron and T-38 Detachment Beddown at Tyndall Air Force Base (AFB), Florida.

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES - The United States Air Force (Air Force) proposes to beddown an F-22 operational squadron and a T-38 detachment at Tyndall Air Force Base (AFB) to consolidate the F-22 fleet and provide additional Air Force capabilities at a strategic location to meet mission responsibilities for worldwide contingencies. The Proposed Action is to beddown 21 primary F-22 aircraft and 20 primary T-38 aircraft. Alternative 1 is to beddown 21 F-22 aircraft and only 10 T-38 aircraft. The F-22 and T-38 beddown would require an additional 671 personnel and 14 contractors. Until the end of Fiscal Year 2010 (FY10), two F-15 squadrons were assigned to Tyndall AFB and utilized the Tyndall AFB airfield and airspace. By the end of the fiscal year, the F-15 squadrons with 809 personnel departed Tyndall AFB as part of an Air Force-wide drawdown of the F-15 fleet. The change in personnel assigned to Tyndall AFB would then be a net loss under the Proposed Action and Alternative 1. F-22 and T-38 training flights would take place on existing Military Operations Areas (MOAs), Air Traffic Control Assigned Airspace (ATCAAs), and offshore warning areas. During training, F-22s would continue to employ defensive chaff and flare countermeasures in airspace authorized for their use and deploy munitions on approved ranges. In FY13, concurrent with the completion of the beddown, Tyndall AFB would be transferred from the Air Education and Training Command (AETC) to Air Combat Command (ACC). Tyndall AFB would report and be funded through the ACC major command. The No Action Alternative would not locate additional F-22s or T-38s at Tyndall AFB at this time.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES – Detailed environmental analysis for the Proposed Action and alternatives is contained in the attached *F-22 Operational Squadron and T-38 Detachment Beddown at Tyndall Air Force Base, Florida Environmental Assessment,* which is hereby incorporated by reference. The Environmental Assessment (EA) addresses the potential environmental consequences from implementing the Proposed Action, Alternative 1, and the No Action Alternative described above. The following resource areas were identified for assessment of potential direct or indirect environmental consequences: airspace management and use, noise, safety, air quality, physical resources, biological resources, cultural resources, land use, socioeconomics, environmental justice, infrastructure, and hazardous waste and materials. Potential cumulative effects for each relevant resource are also presented. As indicated in Chapter 4 of the EA, none of the alternatives would result in significant environmental impacts to any area.

Airspace Management and Use - The proposed F-22 operational squadron and the T-38 detachment would use the same airspace as the current F-22 training squadron. The proposed airspace use of the warning areas, specifically of W-151, would create a greater demand and compete for use with the new F-35s at Eglin AFB. It is expected that Tyndall AFB would schedule these airspace units to the extent required to meet the 325th Fighter Wing (325 FW) training requirements for the F-22 operational squadron, the T-38 detachment, and other 325 FW users. Coordinated scheduling between 325 FW and 46th Test Wing (46 TW) at Eglin AFB would ensure demand for the warning areas and the Tyndall MOAs would not exceed capacity. Therefore, no significant impact would be anticipated to airspace management and use under either the Proposed Action or Alternative 1.

Noise - The total area exposed to noise exceeding 65 decibels Day-Night Average Sound Levels (dB L_{dn}) in the City of Parker, Panama City, and the City of Callaway would increase by 107 acres under the Proposed Action and by 106 acres under Alternative 1 relative to baseline conditions. The number of acres in unincorporated portions of Bay County exposed to noise exceeding 65 L_{dn} would decrease by 190

acres under the Proposed Action and decrease by 191 acres under Alternative 1. The number of persons exposed to noise levels greater than 65 L_{dn} would increase from 593 under baseline conditions to 786 under the Proposed Action and to 782 persons under Alternative 1. Persons exposed to increased noise levels would be more likely to become annoyed by the noise. For either alternative, the frequency of speech interference at the several representative noise-sensitive locations studied would decrease slightly, except at Parker Elementary School, where the number would increase from two per hour to three per hour with windows closed. The L_{dn} at these noise sensitive locations would either remain the same or increase one to two db L_{dn} relative to baseline conditions depending on the location. The probability of sleep disturbance at residential locations studied would remain approximately the same as under baseline conditions, with changes ranging an increase of 1 percent to a decrease of 3 percent under windows open and windows closed scenarios. Existing aircraft noise-related hearing loss concerns in areas on Tyndall AFB would be reduced under either alternative, as fewer structures would be exposed to noise levels at or exceeding 80 L_{dn}. Noise levels generated by subsonic operations in MOAs would result in a change of less than 1 dB Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) relative to baseline conditions. Supersonic operations in the offshore warning areas would result in an increase of 3 dB C-Weighted Day-Night Average Sound Level (L_{cdn}) in W-151 and a decrease of 1 dB L_{cdn} in W-470. No significant impacts from noise are anticipated under the Proposed Action or Alternative 1.

Safety - No aspects of the Proposed Action or Alternative 1 would be expected to create any new or unique safety issues. All activities would continue to be conducted in accordance with applicable regulation, technical orders, and Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) standards. Newly constructed facilities would be built in compliance with Anti-Terrorism/Force Protection (AT/FP) requirements, and sited outside of any identified Quantity-Distance (Q-D) arcs for explosives safety or accident potential zones and clear zones. Flight activities would remain similar to those currently conducted at Tyndall AFB and would be required to continue the applicable procedures outlined in the Tyndall AFB Bird-Aircraft Strike Hazard (BASH) plan. Class A mishap and bird strike risks are expected to be proportional to the amount of training time in the airspace and not expected to be significant. Based upon experience with current training in the airspace and around the airfield, approximately 15 to 20 annual strikes are expected with none resulting in a Class A mishap. Therefore, no significant impacts to safety are anticipated under the Proposed Action or Alternative 1.

Air Quality - Construction activities would cause temporary increases in the regional air quality but would be minimal. Construction emissions would not cause significant impacts to the region's air quality nor would they exceed the National Ambient Air Quality Standards (NAAQS). Aircraft emissions would be below the NAAQS. The construction and operation emissions have the greatest impacts to nitrogen oxides (NO_x), 1,103 tons per year (8.65 percent of Bay County emissions) for the Proposed Action and 791 tons per year (6.20 percent of Bay County) for the Alternative 1. Aircraft emissions make up the majority of these emissions. The NAAQS would not be exceeded by construction and operation activities. No significant impact to regional air quality is expected from the construction or operational aspect of the Proposed Action or Alternative 1.

Physical Resources - Under the Proposed Action, up to approximately 8.12 acres of surface area could be temporarily disturbed due to construction, renovation, and additions to base facilities. This represents an increase of less than 1 percent of total impervious surface. Disturbance in areas greater than one acre require a Construction General Permit under the National Pollutant Discharge Elimination System (NPDES) program. With application of standard construction practices such as stabilizing soil, revegetation of disturbed areas, and silt fencing and sediment traps as needed, potential impacts to soil resources would be minimal and no significant impacts to physical resources would occur due to implementation of the Proposed Action or Alternative 1. Physical resource impacts are not evaluated for the areas below the airspace since no ground-disturbing activities would occur at these locations.

Biological Resources - Implementation of the Proposed Action or Alternative 1 would have minimal effects on wildlife and vegetation at Tyndall AFB. Construction would displace wildlife species such as small mammals and birds inhabiting the construction areas; however, the size of the disturbance zone and proximity to adjacent similar and higher quality habitat would likely displace wildlife species from the immediate area. This disturbance is expected to be short-term and minor given the existing noise environment adjacent to an active airfield. Aircraft are already a major component of the existing noise environment at Tyndall AFB. High priority habitat for the Gulf salt marsh snake, a federal species of concern, lies adjacent to the MSA. Implementation of standard construction practices would minimize potential indirect impacts. Therefore, the Proposed Action and Alternative 1 would have no significant impact to the Gulf salt marsh snake or its habitat. Wildlife that continue to live near airfields are likely accustomed to the types of noise and vibration disturbances produced by missions and are not deterred by the disturbance as long as the habitat is suitable. At this time, no federal or state listed plant or animal species have been documented at the proposed construction areas; however, the vegetative communities in some of these areas have the potential to support several state-sensitive and one federally listed plant species. Surveys have been conducted within the proposed construction areas and no threatened or endangered species were found. The proposed changes in noise levels would not be significantly different from baseline conditions and are not expected to affect any threatened or endangered species populations adversely. Under the Proposed Action and Alternative 1, new facility and road construction would directly impact approximately 0.63 acres of palustrine wetlands as defined by the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventor (NWI). A jurisdictional delineation by the U.S. Army Corps of Engineers (USACE) would be performed and coordinated with the Florida Department of Environmental Protection (FDEP) and the Northwest Florida Water Management District (NWFWMD) for wetlands in the construction area prior to ground-disturbing activities. If jurisdictional wetlands were identified in any of the construction areas, a CWA Section 404 permit through USACE for discharges to waters of the U.S. would be required. During the final design and application for a Section 404 permit Tyndall AFB would develop a formal plan in coordination with USACE, FDEP, and NWFWMD to replace the loss of any wetlands with new, same quality wetlands construction or restoration in a suitable location on the base. Marine mammals could experience stress responses when exposed to aircraft overflights, and potentially vacate or avoid areas of persistent noise. However, aircraft noise would be mobile and transient and would not persist in any given area. In addition, only animals at or near the surface coincident with an overflight would be affected. It is not expected that noise resulting from subsonic flight would significantly affect marine species. Marine mammals exposed to a sonic boom might be startled and exhibit a reaction. However, under the Proposed Action and Alternative 1, the average number of sonic booms per day would range between one and three booms depending on the airspace unit. Therefore, such exposures are not expected to reach levels associated with regulatory thresholds. Chemical materials released into the water column would be of a relatively minute quantity, and would be diluted and dispersed by waves, winds, and tides. Water concentrations would not approach levels considered necessary to impact marine species including plankton, invertebrates, fish, birds, marine mammals, and sea turtles. Therefore, no significant impacts are anticipated to terrestrial or marine biological resources from the Proposed Action or Alternative 1. Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) would not be required.

Cultural Resources - No adverse effects to cultural resources are expected from implementation of the Proposed Action or Alternative 1. The Area of Potential Effect (APE) was previously surveyed for cultural resources. One structure, Building 156 or Hangar #3, is eligible for the National Register of Historic Places. On June 14, 2011, the Florida Division of Historical Resources concurred with the Air Force determination of no adverse effects to this property from the proposed action or alternative 1. Eight federally recognized Native American tribes were contacted regarding the Draft EA. Of the tribes contacted, the Miccosukee Tribe of Indians of Florida verbally concurred with the proposed beddown with no objections. The Seminole Tribe of Florida provided a written letter indicating no comments on the proposed beddown. No responses were received from the remaining tribes. Based on the SHPO

concurrence and results of tribal coordination, no significant impacts to cultural resources are anticipated with the implementation of the Proposed Action or Alternative 1.

Land Use – Under the Proposed Action and Alternative 1, the construction of a deployment-processing center would necessitate the change of the site's current land use classification from open space to aircraft operations and maintenance. Land use classifications near this site would be compatible with the change to the airfield operations classification. Two new munitions igloos would be constructed within the 100-year floodplain. These new igloos are required by safety regulations to be sited within the Munitions Storage Area (MSA) leaving no practicable alternative locations outside of the MSA. The only available site within the MSA is partially within a 100-year floodplain. To comply with the Federal Coastal Zone Management Act, a consistency determination is included in Appendix C. The proposed alternate MSA egress route would extend into the airfield Clear Zone. The roadway would not present a risk to aircraft or project into the imaginary surface. Therefore, no airfield waiver is required. The existing road network is expected to have the capacity to handle the additional personnel as the personnel change is expected to be as much as or less than the number of personnel who have historically been assigned to Tyndall AFB. Noise levels would affect additional acres off-base with noise levels between 65 and 74 dB L_{dn}. Noise levels 75 dB L_{dn} and greater are isolated to Tyndall AFB or open water areas. These areas newly affected by 65-74 dB L_{dn} include residential, commercial, and mixed-use land uses in the city of Parker, the city of Callaway, and unincorporated Bay County. These land uses are compatible with noise levels less than 75 L_{dn} with the incorporation of noise attenuation. Individuals exposed to these aircraft noise levels may experience annoyance; however, changes in land use are not expected. Construction activities and noise levels are not expected to affect outdoor recreation. Noise levels in the primary use airspace would be comparable to baseline noise levels and would not be expected to affect land uses, recreation activities, or special land use areas. Therefore, no significant impacts are anticipated to land use or recreation under either the Proposed Action or Alternative 1.

Socioeconomics - The construction, renovation, and influx of personnel under the Proposed Action and Alternative 1 to Tyndall AFB would have a positive impact on Bay County. There would be temporary and minor benefits to local employment related to construction and renovation activities, which would last for the duration of the projects. The population change associated with the beddown of the F-22 squadron and T-38 detachment would not exceed the number of personnel stationed at Tyndall AFB in recent years. There would most likely be a negligible change in population and employment or public services. The local housing market would be able to provide sufficient housing units for the incoming personnel with no adverse effects on the local housing market and the school districts would be anticipated to have the capacity to accommodate the increase in students without impacting school resources. The number of off-base residents affected by noise levels greater than 65 dB L_{dn} would increase from 593 persons under baseline conditions to 786 persons under the Proposed Action and to 781 persons under Alternative 1. No significant impacts to socioeconomic resources are anticipated under the Proposed Action or Alternative 1.

Environmental Justice - No disproportionately high and adverse human health or environmental effects have been identified to minority or low-income populations due to construction activities at Tyndall AFB. Construction and renovation activities would occur within the boundaries of Tyndall AFB and would not impact off-base populations. Flight operations from the F-22 and T-38 training missions would not present a disproportionately high and adverse environmental effect to minority or low-income populations since the share of affected populations of concern is comparable to the populations of concern in Bay County. Noise levels at Tyndall Elementary would remain the same relative to baseline conditions. Noise levels at Parker Elementary would remain below 65 L_{dn}. In addition, noise levels in the training airspace would not generate disproportionately high and adverse human health or environmental effects on minority populations, low-income populations, or children living under the airspace since the noise

levels generated in these airspace units remain the same under the Proposed Action and Alternative 1 as noise levels under baseline conditions.

Infrastructure – Under the Proposed Action and Alternative 1, there is no increase in manpower anticipated with the beddown over past levels. The capacity of Tyndall AFB's infrastructure including potable water, sanitary sewer system, stormwater discharge system, solid waste, electrical, and natural gas would continue to operate below capacity and would not be affected by the increased demand. Therefore, no significant impacts to infrastructure are anticipated under the Proposed Action or Alternative 1.

Hazardous Waste and Materials – It is not anticipated that the increase in jet fuel consumption would significantly increase over levels experienced at the installation in the recent past and would be supported by the current fuel infrastructure. There would be a short-term increase in the quantity of hazardous materials and petroleum substances stored at Tyndall AFB to support construction activities. Some construction activities would be conducted in the vicinity of Environmental Restoration Program (ERP) sites and associated monitoring wells. If the construction footprint overlaps existing monitoring wells, the wells must be properly abandoned in accordance with state procedures. Military construction activities in or near ERP sites requires an approved waiver from Headquarters AETC or HQ ACC depending on the timing of the construction activities and which major command Tyndall AFB reports to at that time. Additional worker precautions as well as a site-specific health and safety plans approved by a Certified Industrial Hygienist would be required by the waiver. Surveys would be conducted prior to construction activities to determine the presence of asbestos-containing material (ACM) and employ appropriately trained and Florida-licensed contractors to perform the removal work. Since implementation of the Proposed Action or Alternative 1 would not materially change the amount of hazardous wastes generated at Tyndall AFB, no significant impacts are anticipated. No significant impacts in regards to ERP sites or toxic substances are anticipated with appropriate waivers and surveys completed as described above.

CONCLUSION - Based on the findings of the EA conducted in accordance with the requirements of the National Environmental Policy Act, the Council on Environmental Quality regulations, and 32 CFR 989, *et seq.*, and after careful review of the potential impacts, I conclude that implementation of the Proposed Action or Alternative 1 would not result in significant impacts to the quality of the human or the natural environment. Therefore, a Finding of No Significant Impact is warranted, and an Environmental Impact Statement is not required for this action. Pursuant to Executive Orders 11988 and 11990, the authority delegated in the Secretary of the Air Force Order 791.1 and taking the above information into account, I find there is no practicable alternative to this action.

GARY D. CHESLEY, Colonel, USAF
Deputy Director, Installations and Mission Support

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Environmental Assessment

F-22 Operational Squadron and T-38 Detachment Beddown at Tyndall Air Force Base, Florida

August 2011

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1 PURPOSE AND NEED FOR F-22 AND T-38 BEDDOWN AT TYNDALL AFB

In 1985, Congress determined that a need existed to provide the United States (U.S.) Air Force (Air Force) with a next-generation fighter to replace and supplement the aging F-15C and newer F-15E fleet, to ensure air dominance well into the 21st century. Congress determined that the F-22 would meet this need. In 2000, the Air Force selected Tyndall Air Force Base (AFB), Florida, as the location for the F-22 Formal Training Unit (FTU) in the *Conversion of Two F-15 Fighter Squadrons to F-22 Fighter Squadrons at Tyndall AFB, Florida Final Environmental Impact Statement* dated 5 May 2000.

On 29 July 2010, the Department of the Air Force announced actions to consolidate the F-22 fleet. The Secretary and Chief of Staff of the Air Force determined that the most effective basing for the F-22 required redistributing one operational (or combat-coded) F-22 squadron with 21 Primary Aircraft Authorized (PAA), 2 Backup Aircraft Inventory (BAI), and 1 Attrition Reserve (AR) from Holloman AFB, New Mexico to Tyndall AFB, Florida. The second F-22 operational squadron, which is located at Holloman AFB, would be redistributed to existing F-22 units at Joint Base Elmendorf-Richardson (JBER); Joint Base Langley-Eustis, Virginia; and Nellis AFB, Nevada. This consolidation would maximize combat aircraft and squadrons available for contingencies and enhance F-22 operational flexibility.

In addition to the F-22 beddown, the Secretary of the Air Force approved a program change request on 14 November 2010 to redistribute T-38 aircraft from Beale AFB, California and Holloman AFB, New Mexico to Tyndall AFB and Joint Base Langley-Eustis, Virginia in support of F-22 operations. The T-38 has been used successfully as an adversary trainer at Beale AFB and Holloman AFB, as well as Whiteman AFB in Missouri. The T-38 detachment proposed for Tyndall AFB would provide an aggressor for dissimilar air combat training, also known as Red Air. Using the T-38s as Red Air instead of other F-22s is less costly in terms of flying hours and would support and enhance the readiness of the F-22 pilots.

1.1 Background

The F-22 is a 21st century fighter designed to replace and supplement F-15C and F-15E aircraft, both of which can be targeted by enemy air defenses at increasingly greater distances. The F-22 has the stealth, speed, and maneuverability to overcome adversaries and ensure air dominance over any battlefield. The purpose of locating an operational F-22 squadron at Tyndall AFB is to locate more of these advanced assets in strategic locations in the U.S. and to capitalize on the range and airspace assets available at Tyndall AFB.

Between 2003 and 2005, one F-15 squadron was converted into an F-22 squadron and 28 PAA were delivered from the manufacturer to Tyndall AFB. With the decision by the Department of Defense (DoD) to reduce the number of F-22 aircraft manufactured, the second F-22 training squadron did not stand up at Tyndall AFB. In May 2009, the Air Force announced the drawdown and reassignment of F-15 squadrons, including the two remaining F-15 squadrons

with 48 PAA at Tyndall AFB. By the end of Fiscal Year 2010 (FY10), the last F-15 left Tyndall AFB.

The Proposed Action presented in this Environmental Assessment (EA) beds down an operational squadron consisting of 21 PAA, two BAI, and one AR F-22s and a detachment of up to 20 PAA T-38s. It implements construction and renovation to provide facilities for the new aircraft, conducts flying sorties at the base for training and deployment after beddown and implements personnel changes to conform to F-22 and T-38 requirements. PAA are aircraft authorized to a unit for performance of its operational mission. BAI are aircraft authorized to a unit as backup aircraft for use in the event maintenance is necessary on an aircraft from PAA. The AR aircraft is an aircraft kept in reserve to replace primary aircraft losses in a given year. The primary authorization forms the basis for the allocation of operating resources to include manpower, support equipment, and flying-hour funds. Detailed information on the proposal including construction requirements, manpower changes, and flight operations are discussed in detail in Chapter 2.

This EA addresses the potential environmental consequences associated with the beddown of the F-22 operational squadron and the T-38 detachment, according to the requirements of the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 *et seq.*), the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500–1508), and the Environmental Impact Analysis Process (EIAP) (Air Force Instruction [AFI] 32-7061 as promulgated in 32 CFR 989 *et seq.*). NEPA is the basic national charter for identifying environmental consequences of major federal actions and ensures that environmental information is available to the public, agencies, and decision-makers before decisions are made and before actions are taken.

1.1.1 Aircraft Characteristics of the F-22 and the T-38

The F-22 was designed to ensure that America's armed forces retain air dominance. This means complete control of the airspace over an area of conflict, allowing freedom to attack and freedom from attack at all times. Air dominance defends American and Allied forces from enemy attack and provides the ability to attack air and ground adversary forces without hindrance from enemy aircraft. During the initial phases of deployment into an area of conflict, the first aircraft to arrive are the most vulnerable since they face the entire warfighting capability of an adversary. The F-22's state-of-the-art technology, advanced tactics and skilled aircrew ensures air dominance from the outset. The F-22 has the stealth, speed, and maneuverability to overcome the adversary's improvements in air defenses and ensure air dominance over any battlefield.

The F-22 is a single-seat, all-weather, multipurpose fighter capable of both air-to-air and air-to-ground missions. Powered by two 35,000-pound thrust-class engines, the F-22 routinely operates at high altitudes (above 30,000 feet mean sea level [MSL]) and at high speeds. The F-22 can achieve the speed necessary for air-to-air combat while using relatively low power settings. The F-22 can launch sophisticated weapons at high speeds and from greater distances than possible with other aircraft. The F-22 is approximately 62 feet long with a wingspan of 44 feet and a height of more than 16 feet.

F-22 aircraft can carry a variety of weapons including air-to-air missiles, conventional and Long-Range Standoff Weapons (LRSWs) for air-to-ground ordnance delivery, and 20-millimeter (mm) multi-barrel cannon. Training in the Tyndall AFB airspace and warning areas simulates air-to-air missiles by aircraft exercising all aspects of the weapon system without actually launching an air-to-air missile. In addition to air-to-air missiles, the F-22 uses a 20mm cannon for air-to-air engagements. These training events are conducted in the warning areas against a towed target using inert training practice rounds. Air-to-ground training with LRSW would include flying to launch profiles and speeds at high altitude with simulated launches. In the overland MOAs, only defensive flares are authorized. Existing conventional ranges would be used for live munitions training. Release profiles, altitudes, and speeds would be limited to keep weapon safety footprints within established ranges.

The F-22 aircraft proposed for beddown at Tyndall AFB would be combat-coded (or operational) aircraft as opposed to the training aircraft currently stationed at Tyndall AFB. Each individual aircraft within the Air Force inventory is "coded" according to its function (e.g., testing, training, combat). A combat coded (or operational) F-22 squadron is a squadron that is certified to deploy to a combat zone. The operational squadron follows a guideline called the Ready Aircrew Program (RAP), which designates the training events required for an aircraft and pilot to be considered combat-coded. The training squadron follows a training syllabus, which designates the training events required for an aircraft and pilot to be considered sufficient in operating the aircraft.

The T-38 is designed as an advanced jet pilot trainer and is used by Air Combat Command (ACC) and the Air Education Training Command (AETC) to prepare pilots for frontline fighter aircraft such as the F-15, F-16, and the F-22. In addition to its use as a training aircraft, it has also been used as a companion aircraft to the B-2 at Whiteman AFB and to the U-2 aircraft at Beale AFB. The cost per flying hour and ease of maintenance of the T-38 makes it an economical trainer and companion/adversary aircraft. The T-38 is a twin engine, two-seat aircraft capable of supersonic speeds and high altitudes. The T-38A is the variant expected to be beddown at Tyndall AFB; however, the T-38B may also beddown. The T-38A and the T-38B have the same engine type. It is approximately 46 feet long with a wingspan of 15 feet and a height of nearly 13 feet. The use of the T-38 as Red Air to the F-22 would provide the Air Force with a cost savings compared to using F-22s or F-15s and would provide F-22 pilots with valuable experience in dissimilar air combat training.

1.1.2 Tyndall AFB

Tyndall AFB (located near Panama City, Florida) is home to the 325th Fighter Wing (325 FW), the 53rd Weapons Evaluation Group (53 WEG), the 1st Air Force, and several other tenant units. The mission of the 325 FW (as part of AETC) is to train F-22 pilots, maintainers, and air battle managers to support the Air Force. The 325 FW is composed of one F-22 training squadron with 28 PAAs. Up to 40 QF-4s serve as both manned and unmanned drones used in target practice and training of the F-22 pilots. MU-2s and E-9s are also stationed at Tyndall AFB to be used by host and tenant organizations.

1.2 Purpose of the F-22 and T-38 Beddown

The purpose of the proposed beddown of F-22 aircraft at Tyndall AFB would be to consolidate the F-22 fleet and provide additional Air Force capabilities at a strategic location to meet mission responsibilities for worldwide deployment. The purpose of the proposed beddown of the T-38 detachment would be to provide a low-cost adversary to enhance F-22 training. The beddown of 21 F-22 PAA and up to 20 T-38 PAA would provide enhanced capabilities while efficiently using Tyndall AFB facilities.

1.3 Need for F-22 and T-38 Beddown

Locating a combat-coded F-22 squadron at Tyndall AFB would provide additional synergies between the training and operational missions while capitalizing on the capacity and strategic assets provided by Tyndall AFB. Additional F-22 aircraft are needed at Tyndall AFB to consolidate the F-22 fleet and to provide expanded Air Force capability to respond efficiently to national objectives, be available for contingencies, and enhance F-22 operational flexibility. The T-38 detachment is needed to provide a low-cost aggressor force for F-22 training and provide F-22 pilots experience with dissimilar air combat training.

2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

The proposed beddown of the F-22 operational squadron and the T-38 detachment would involve activities at the base and in the associated training airspace. This chapter presents proposed activities at the base, training use of Special Use Airspace (SUA), and the use of air-to-ground ranges, as well as the personnel associated with the beddown under the Proposed Action in Section 2.2. Alternative 1 is described in Section 2.4. The No Action Alternative is described in conformance with CEQ regulations (40 CFR 1502.14(d)) in Section 2.5.

2.1 Selection Criteria

In early 2010, the Air Force determined that the F-22 fleet required restructuring to optimize combat capability and improve fleet stability. The Air Combat Command Plans and Programming Directorate (ACC/A5) was tasked to execute the Strategic Basing Process to evaluate different courses of action to affect the restructuring. In coordination with Assistant Secretary of the Air Force for Installations, Environment, and Logistics and Headquarters Air Force, the ACC developed criteria to evaluate existing active duty F-22 bases to determine the best course of action.

Criteria were divided into four major areas (Mission, Cost, Capacity, and Environmental). Individual criteria within the major evaluation areas included items such as weather, airspace, training synergy, DoD cost factors, multiple facility requirements/capacities, air quality and encroachment. Site survey teams from ACC looked at four bases (Elmendorf AFB, AK; Holloman AFB, NM; Joint Base Langley-Eustis, VA; Tyndall AFB, FL) and employed an objective, interdisciplinary approach to evaluate operational, logistical, facilities, communications and security capabilities to support the potential F-22 restructure.

Activities Affecting Tyndall AFB

- Beddown 21 additional F-22 PAA and up to 20 T-38 PAA over a period of approximately three years.
- Conduct flying sorties at the base for training and deployment.
- Implement the personnel changes at the base to conform to the expanded F-22 and T-38 wing's requirements.
- Transfer Tyndall AFB's MAJCOM from AETC to ACC.

Elements Affecting Training Airspace

- Conduct F-22 and T-38 training flights in MOAs, ATCAAs, and warning areas.
- Employ defensive countermeasures (chaff and flares) in airspace authorized for their use.

The Strategic Basing Executive Steering Group (SB-ESG) briefed site survey results and other considerations to the Secretary of the Air Force and Chief of Staff of the Air Force in July 2010. On 29 July 2010, the Chief of Staff announced that Tyndall AFB, FL would be recommended as the preferred alternative for the beddown of a 21 PAA F-22 operational squadron in FY13. Concurrent with the F-22 restructuring, a programming change request provided T-38 Adversary Air Trainers to support existing and future F-22 operations. In November 2010, the request was approved and recommended the beddown of at least 10 PAA T-38s at Tyndall AFB. The beddown of another 10 T-38 aircraft at Tyndall AFB is dependent upon funding. In addition, in FY13, Major

Command (MAJCOM) control of Tyndall AFB would be transferred from AETC to ACC. Tyndall AFB would then report to HQ ACC and HQ ACC would allocate funding and set internal Air Force policies for Tyndall AFB.

The beddown of the F-22 operational squadron and the T-38 detachment would utilize the capacity made available by the departure of the F-15s and would retain the mission capabilities at Tyndall AFB.

2.2 Proposed Action - Elements Affecting Tyndall AFB

The proposed beddown of the F-22 operational squadron and the T-38 detachment could affect the following two aspects of the base: 1) the beddown could affect the base and its environs and 2) the beddown would affect the numbers and responsibilities of base personnel. The proposed personnel change is described in this section.

2.2.1 Flight Activities

The F-22 operational squadron and the T-38 detachment would conduct slightly different airfield operations from each other and from the existing F-22 training squadron, but both would conduct take-offs and landings, practice approaches, conduct training, and support deployments. The Air Force estimates that the F-22 operational squadron would conduct 4,032 sorties per year and the T-38 detachment would conduct 3,120 sorties per year.

A SORTIE IS THE FLIGHT OF A SINGLE AIRCRAFT FROM TAKEOFF TO LANDING.

AN AIRFIELD OPERATION IS THE SINGLE MOVEMENT OR INDIVIDUAL PORTION OF A FLIGHT IN THE BASE AIRFIELD ENVIRONMENT SUCH AS ONE LANDING, ONE TAKEOFF, OR ONE TRANSIT OF THE AIRFIELD TRAFFIC AREA.

Table 2-1 presents the number of aircraft stationed at Tyndall AFB under the baseline, the No Action Alternative, the Proposed Action, and Alternative 1. Baseline conditions described throughout this EA; including baseline airfield operations, sortie-operations, and noise levels; include the level of activity experienced by Tyndall AFB prior to the departure of two F-15 squadrons in September 2010. This baseline reflects the most representative operational tempo for Tyndall AFB. Additionally, since Tyndall AFB has not been without the two F-15 squadrons for a year, complete data for operations and personnel at Tyndall AFB without the F-15 squadrons is not available. Conditions under the No Action alternative reflect the current state of Tyndall AFB without the F-15 squadrons. Aircraft flight activities under the No Action alternative are estimated using available data and removing the activities conducted by the F-15 squadrons. Table 2–2 also presents the existing and proposed annual airfield operations by Tyndall AFB-based aircraft split into day and night operations. The T-38 requires the use of afterburners for every take-off while the F-22 would use afterburners for no more than 10 percent of their take-offs. F-22s and T-38s would fly approximately 5 percent of total departure and landing operations after 10:00 PM, which is known as "environmental night". Noise analysis applies a 10-decibel (dB) penalty to noise levels occurring during environmental night. In support of Air Force Reserve Command operations, F-22 and T-38 flight operations would occur at least one weekend per month.

Table 2–1. Baseline and Proposed Primary Aircraft Assigned to Tyndall AFB

Aircraft Type	Number of Primary Aircraft Authorized (PAA)			
	Baseline	No Action Alternative	Proposed Action	Alternative 1
F-15 C/D	48	0	0	0
F-22 (training)	28	28	28	28
F-22 (operational)	0	0	21	21
T-38	0	0	20	10
QF-4	40	40	40	40
MU-2	8	8	8	8
E-9A	2	2	2	2
Total Aircraft	**126**	**78**	**119**	**109**

Table 2–2. Annual Airfield Operations at Tyndall AFB

Aircraft Type	Annual Airfield Operations (Day/Night)			
	Baseline*	No Action Alternative	Proposed Action	Alternative 1
F-15	63,349 / 1,932	2,518 / 11	2,518 / 11	2,518 / 11
F-22 (training)	31,124 / 959	31,124 / 959	31,124 / 959	31,124 / 959
F-22 (operational	0 / 0	0 / 0	15,323 / 805	15,323 / 805
T-38	0 / 0	0 / 0	8,891 / 469	4,448 / 236
F-16	1,791 / 50	1,791 / 50	1,791 / 50	1,791 / 50
QF-4*	3,045 / 0	3,045 / 0	3,045 / 0	3,045 / 0
MU-2*	4,160 / 0	4,160 / 0	4,160 / 0	4,160 / 0
E-9A*	250 / 0	250 / 0	250 / 0	250 / 0
C-172	5,616 / 0	5,616 / 0	5,616 / 0	5,616 / 0
C-210	104 / 0	104 / 0	104 / 0	104 / 0
GR-1	49 / 1	49 / 1	49 / 1	49 / 1
Transient	4,042 / 0	4,042 / 0	4,042 / 0	4,042 / 0
Total Airfield Operations	**113,530 / 2,941**	**52,699 / 1,021**	**76,913 / 2,295**	**72,470 / 2,062**

Note: * Data from 2008 AICUZ (Tyndall AFB 2008a). F-15 airfield operations under the No Action alternative, Proposed Action, and Alternative 1 are F-15s assigned to the 53rd Weapons Evaluation Group (53 WEG).

2.2.2 Base Facilities

The Air Force evaluated the facilities available on Tyndall AFB to assess the condition and capability of the facilities to accommodate the F-22 or T-38. From this evaluation, some additional requirements were identified to supply the needed space and equipment for the F-22 and T-38s maintenance requirements and to provide the munitions capacity required for an operational squadron.

Figure 2–1 shows construction and renovation facilities under the Proposed Action. Table 2–3 provides descriptions of the projects, areas of disturbance, and map reference numbers correlating to Figure 2–1. The new F-22 squadron and the T-38 detachment would utilize the existing facilities available from the departure of the F-15 squadrons. Renovations to Hangar 1, Hangar 2, Squadron Operations, and the insertion of two Low Observable/Composite Repair (LO/CR) bays into Hangar 4 would be interior renovations and not impact the exterior of the buildings. Repairing the pavement in the Live Ordnance Loading Area (LOLA)/Live Ordnance Departure Area (LODA) and the existing roads within the MSA would occur within the existing roadway footprint. New construction would be focused within the MSA. Construction in the MSA includes two new munitions storage igloos (constructed within the existing fence line), construction of a Munitions Assembly Conveyor (MAC) pad with an associated parking lot and new roads connecting the MAC pad with the rest of the MSA roadway system, and a 4-bay

maintenance and inspections facility. Extending from the new MAC pad and parking area, an alternate MSA egress route would be constructed and connected to the flightline road system. The proposed alternate MSA egress route would be used only as secondary route for personnel out of the MSA in the event of an emergency. The new road was sited to minimize the impact to identified wetlands. In addition to the siting, the Air Force may use gravel for the surface of the road south of the proposed MAC pad and parking.

Table 2–3. Renovation and Construction Activities - Proposed Action

Map Reference Number (See Figure 2-1)	Description	Area of Disturbance (square feet)
Interior Renovations or Repairs		
1	Hangar 1 (Building 182)	N/A
2	Squadron Operations (Building 164)	N/A
3	Hangar 2 (Building 180)	N/A
4	2 Low Observable/Composite Repair (LO/CR) Bays (Hangar 4-Building 280)	N/A
5	Repair Munitions Storage Area (MSA) Roads	N/A
17	Hangar 3 (Building 156)	N/A
Additions		
8	Mobility Readiness Spare Package (MRSP)/Parts Store Addition (Building 266)	3,000
9	Egress (Building 126)	2,000
New Construction		
6	Expand Pavement at Live Ordnance Loading Area (LOLA)/Live Ordnance Departure Area (LODA) (1,000ft x 160ft)	160,000
7	Alternate MSA Egress Route Extension (3,500 ft long and 2 lanes)	175,000*
10	Alternate Mission Equipment (AME) Storage (Building 107)	4.500
11	Deployment Processing Center	40,000
12	Covered Munitions Assembly Conveyer (MAC) Pad (100ft x 100ft)	10,000
	Privately Owned Vehicle (POV) Parking	7,605
13	LOLA Support Facility	500
14	2 Munitions Storage Igloos	12,000(each)
15	4-Bay Maintenance (MX)/Inspection Facility	9,010
16	Inert Storage	9,000

Note: *Assumes disturbance from road construction would be 50 feet wide.

New construction outside of the MSA includes the construction of a LOLA support facility near the LOLA/LODA. This facility would be sited and constructed in accordance with Air Force airfield safety guidelines. A center for deployment processing would be constructed near the flightline to support the new F-22 operational squadron, which would be expected to deploy at necessary intervals. Three facilities would be expanded to accommodate the increased operations from the new F-22 squadron and the T-38 detachment. These facilities are located on the flightline in previously disturbed areas.

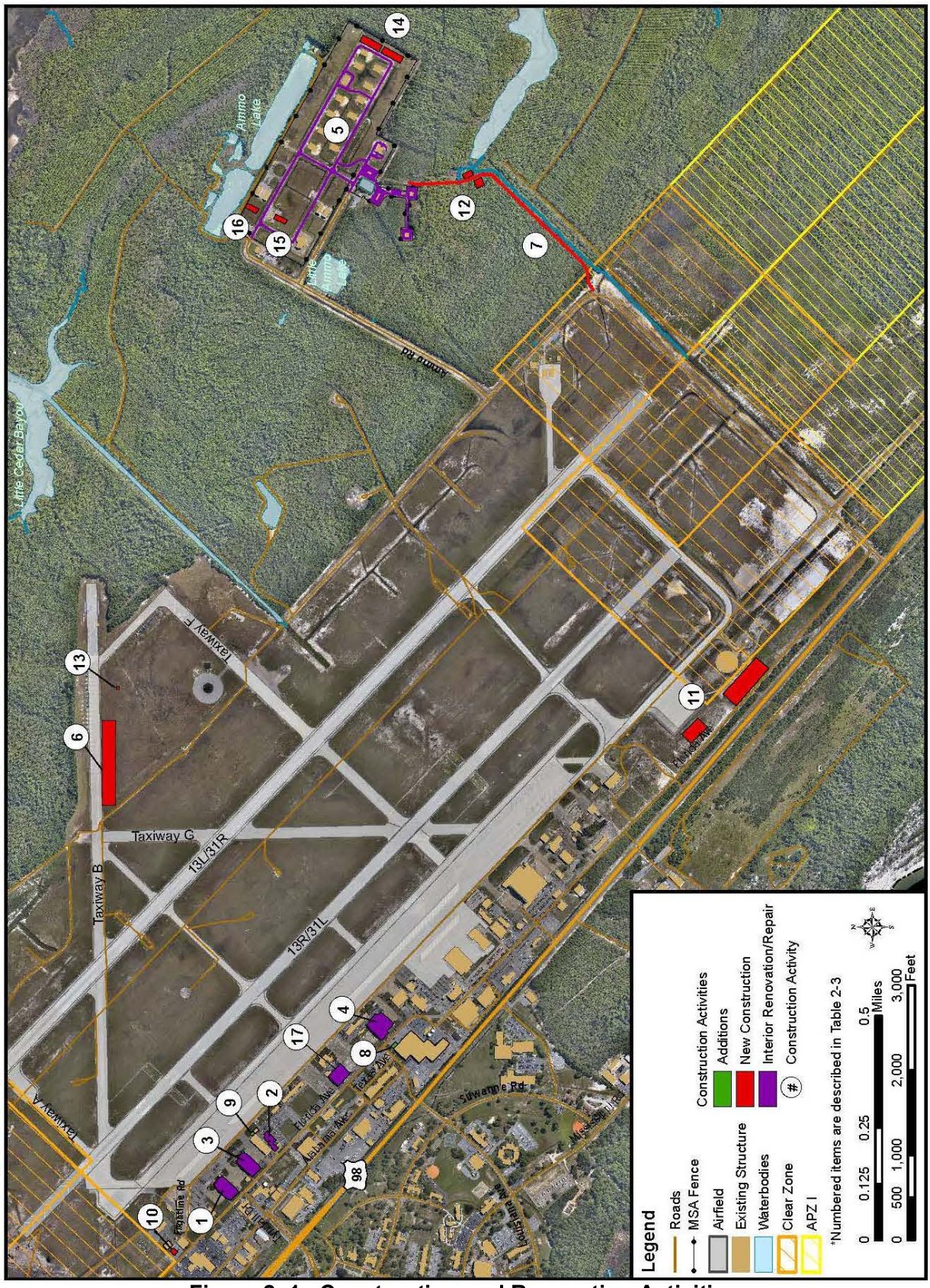

Figure 2–1. Construction and Renovation Activities

2.2.3 Personnel

The addition of the F-22 operational squadron and a T-38 detachment would require additional personnel at Tyndall AFB to operate and maintain the aircraft and provide support services. The F-22 operational squadron is relocating to Tyndall AFB from Holloman AFB so personnel currently stationed at Holloman AFB associated with the relocating squadron would transfer to Tyndall AFB. An estimated 671 personnel are required to support the F-22 operational squadron. The addition of a T-38 detachment would require adding up to 14 contract personnel for maintenance. Dedicated T-38 pilots and dual qualified QF-4/T-38 and F-22/T-38 pilots would operate the T-38s.

2.3 Proposed Action – Elements Affecting Airspace

F-22s at Tyndall AFB conduct similar missions and training programs as the F-22 training squadron, the F-15Cs, and F-15Ds, which were previously located at Tyndall AFB. The Air Force expects that the additional F-22s and the T-38s would use the training airspace associated with Tyndall AFB as well as some airspace units scheduled by Eglin AFB in a manner similar to the training F-22s currently based there (Figure 2–2). All F-22 and T-38 flight activities would take place in existing airspace.

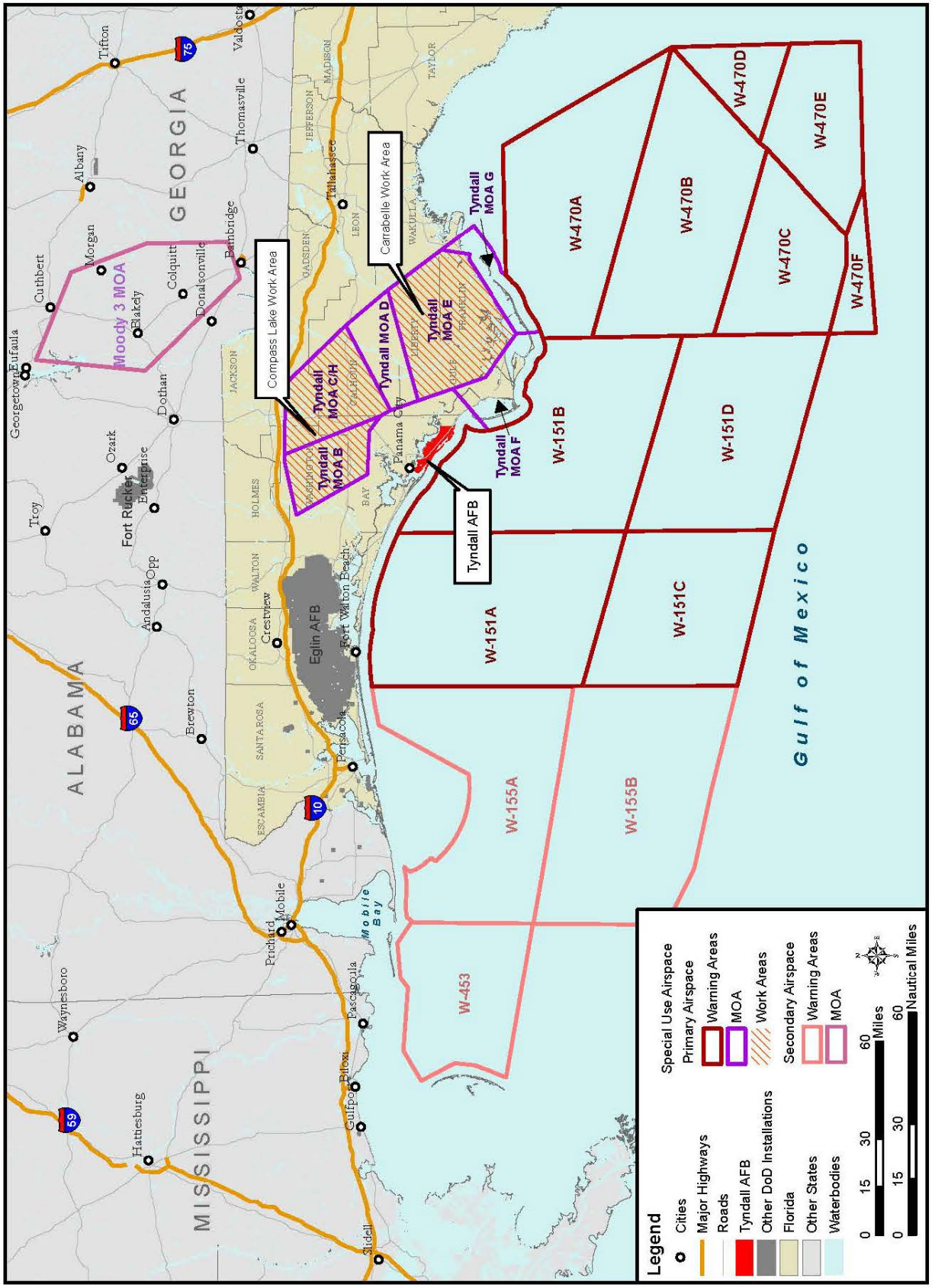

Figure 2–2. Training Special Use Airspace (SUA)

Figure 2–3 displays the three types of training airspace. These three airspace types would be used by F-22 and T-38 aircraft for training. Airspace managed by Tyndall AFB and Eglin AFB associated with this proposed F-22 and T-38 beddown includes warning areas, MOAs, and ATCAAs. Air-to-ground training would occur in designated areas within the warning areas. For training events that cannot be accommodated in the warning areas, such as live ordnance delivery, the F-22 aircraft would transit to a designated range, such as the Nevada Test and Training Range (NTTR).

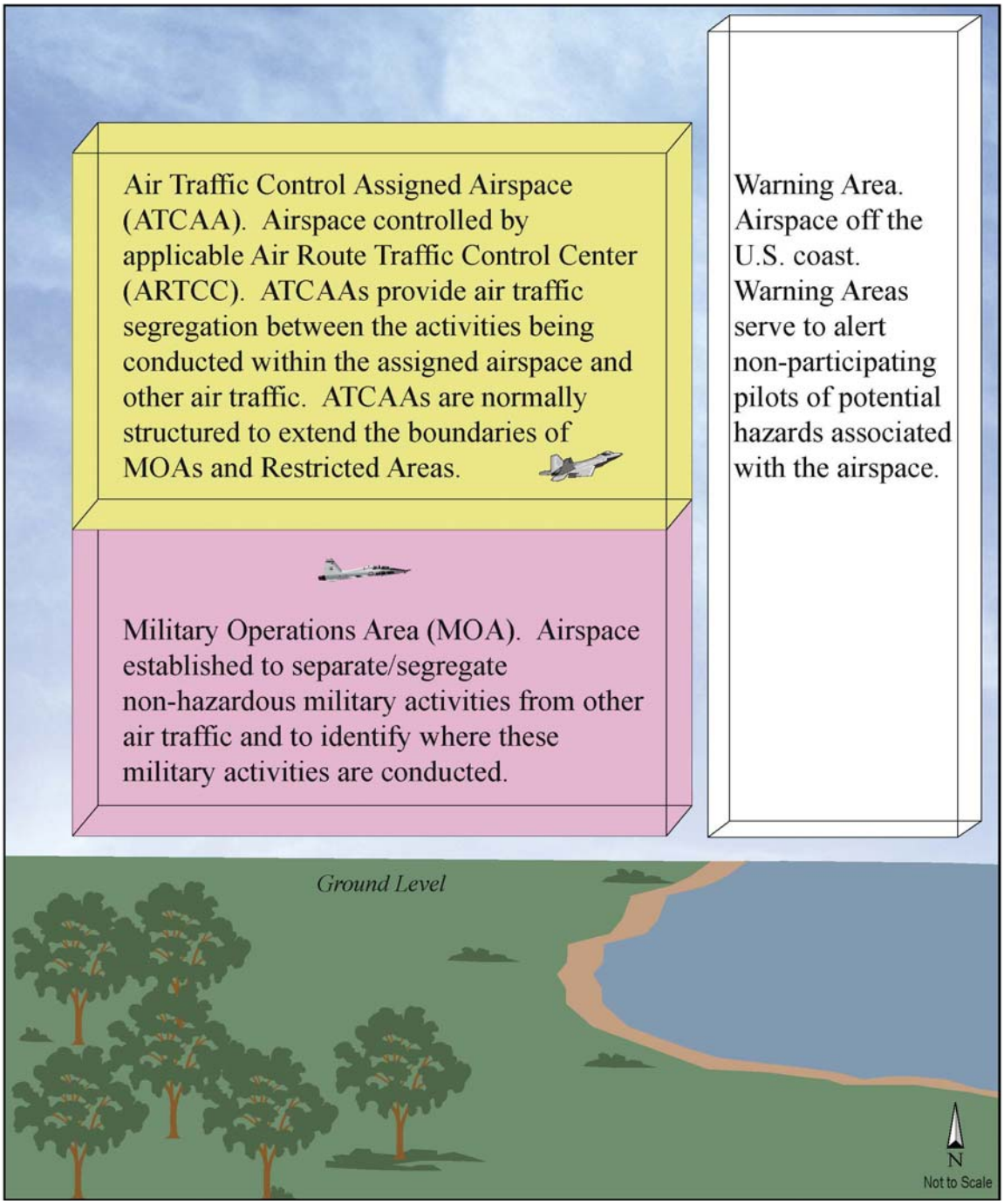

Figure 2–3. Types of Training Airspace

Operational requirements and performance characteristics of the F-22 dictate that most training would occur in warning areas, MOAs, and ATCAAs. Warning areas are airspace of defined dimensions established three nautical miles (nm) from the coast of the U.S. that contain activities that may be hazardous to nonparticipating aircraft (those not using the MOA for training). The warning areas associated with Tyndall AFB and Eglin AFB are established off the coast of Florida over the Gulf of Mexico.

MOAs are established by the Federal Aviation Administration (FAA) to separate military training aircraft from non-participating aircraft. Non-participating military and civil aircraft flying under Visual Flight Rules (VFRs) may transit an active MOA by employing see-and-avoid procedures. When flying under instrument rules, non-participating aircraft must obtain clearance from Air Traffic Control (ATC) to enter an active MOA.

An ATCAA is airspace often overlying a MOA that extends from 18,000 feet MSL to the altitude assigned by the FAA. Assigned on an as-needed basis and established by a letter of agreement between a military unit and the local FAA Air Route Traffic Control Center (ARTCC), each ATCAA provides additional airspace for training. ATCAAs are released to military users by the FAA only for the time they are to be used, allowing maximum access to the airspace by civilian aviation.

The Compass Lake Work Area is comprised of the Tyndall B and Tyndall H MOAs with an overlying ATCAA scheduled together and operated as a single block of airspace extending from 9,000 feet Above Ground Level (AGL) Up To But Not Including (UTBNI) 23,000 feet MSL. The Carrabelle Work Area is typically comprised of a subset of the Tyndall E MOA with an overlying ATCAA, extending from 9,000 feet AGL UTBNI 37,000 feet MSL.

Military Training Routes (MTRs) are flight corridors used to practice high-speed, low-altitude training that generally occur below 10,000 feet MSL. They are described by a centerline, with defined horizontal limits on either side of the centerline and vertical limits expressed as minimum and maximum altitudes along the flight track. Currently, the F-22 does not use MTRs and therefore, use of MTRs is not included in this proposal.

Table 2–4 describes the typical F-22 air superiority missions and training and their training requirements in terms of airspace and altitudes. As discussed in Sections 2.2.1 and 2.2.2, not all of the missions described in Table 2-4 can be accomplished at Tyndall AFB or in Tyndall AFB airspace. Some missions would be completed at an Air Force range such as NTTR where such missions can be accommodated.

Table 2–4. F-22 Training Activities

Activity	Description	Airspace Type	Altitude (feet)	Time in Airspace
Aircraft Handling Characteristics	Training for proficiency in use and exploitation of the aircraft's flight capabilities (consistent with operational and safety constraints) including, but not limited to high/maximum angle of attack maneuvering, energy management, minimum time turns, maximum/optimum acceleration and deceleration techniques, and confidence maneuvers.	MOA and ATCAA	5,000 AGL to 60,000 MSL	0.5 to 1.0 hour
Basic Fighter Maneuvers	Training designed to apply aircraft (1 versus 1) handling skills to gain proficiency in recognizing and solving range, closure, aspect, angle, and turning room problems in relationship to another aircraft to attain a position from which weapons may be launched or to defeat weapons employed by an adversary.	MOA and ATCAA	5,000 AGL to 30,000 MSL	0.5 to 1.0 hour
Air Combat Maneuvers	Training designed to achieve proficiency in formation (2 versus 1 or 2 versus 1+1) maneuvering and the coordinated application of basic fighter maneuvers to achieve a simulated kill or effectively defend against one or more aircraft from a pre-planned starting position. Includes the use of defensive countermeasures such as chaff and/or flares. Air combat maneuvers may be accomplished from a visual formation or short-range to beyond visual range.	MOA and ATCAA	5,000 AGL to 60,000 MSL	0.5 to 1.0 hour
Low-Altitude Training	Aircraft offensive and defensive operations at low altitude, Force awareness at low altitude, aircraft handling, turns, tactical formations, navigation, threat awareness, defensive response, defensive countermeasures (chaff/flares) use, low-to-high and high-to-low altitude intercepts, missile defense, combat air patrol against low/medium altitude adversaries.	MOA	500 AGL to 5,000 AGL	0.5 to 1.0 hour
Tactical Intercepts	Training (1 versus 1 up to 4 versus multiple adversaries) designed to achieve proficiency in formation tactics, radar employment, identification, weapons employment, defensive response, electronic countermeasures, and electronic counter-countermeasures.	MOA and ATCAA	500 AGL to 60,000 MSL	0.5 to 1.0 hour
Night Operations	Aircraft intercepts (1 versus 1 up to 4 versus multiple adversaries) flown between the hours of sunset and sunrise including tactical intercepts, weapons-employment, offensive and defensive maneuvering, chaff/flare use, and electronic countermeasures.	Warning Area, MOA, and ATCAA	2,000 AGL to 60,000 MSL	0.75 to 1.5 hour
(Dissimilar) Air Combat Tactics	Multi-aircraft and multi-adversary (2 versus multiple to larger force exercises) conducting offensive and defensive operations; combat air patrol; defense of airspace sector from composite force attack; intercept, simulate, and destroy bomber aircraft; destroy/avoid adversary ground and air threats with simulated munitions and defensive countermeasures; strike-force rendezvous and protection.	MOA and ATCAA	500 AGL to 60,000 MSL	0.5 to 1.0 hour
Basic Surface Attack	Air-to-ground simulated delivery of ordnance on a range.	MOA, RA	Surface to 60,000 MSL	0.5 to 1.0 hour
Tactical Weapons Delivery	More challenging multiple attack headings and profiles where the pilot is exposed to varying visual cues, shadow patterns, and the overall configuration and appearance of the target. Supersonic speeds that can include target acquisition are added to the challenge.	ATCAA, MOA, RA	Surface to 60,000 MSL	0.5 to 1.0 hour
Surface Attack Tactics	Practiced in a block of airspace, such as a MOA or RA, that provides room to maneuver up to supersonic speeds. Defensive countermeasures may be deployed. Precise timing during the ingress to the target is practiced, as is target acquisition. Training includes egress from the target area and reforming into a tactical formation.	ATCAA, MOA, RA	Surface to 60,000 MSL	0.5 to 1.0 hour

Activity	Description	Airspace Type	Altitude (feet)	Time in Airspace
LRSW Delivery	Practiced in a MOA or ATCAA that provides for maneuvering room and supersonic speeds. Precise timing for speed, altitude, and launch parameters is practiced at high altitudes without release. Use of inert munitions in low altitude drops to evaluate timing and aircraft performance. Remote training using LRSW at authorized ranges outside Alaska.	ATCAA, MOA, RA	Surface to 60,000 MSL	0.5 to 1.0 hour
Suppression of Enemy Air Defenses (SEAD)	Highly specialized mission requiring specific ordnance and avionics and can include supersonic speeds and defensive countermeasures. The objective of this mission is to simulate neutralizing or destroying ground based anti-aircraft systems	ATCAA, MOA, RA	Surface to 60,000 MSL	0.5 to 1.0 hour
Large Force Exercises/ Mission Employment (60 days per year)	Multi-aircraft and multi-adversary composite strike force exercise (day or night), air refueling, and strike-force rendezvous, conducting air-to-ground strikes, strike force defense and escort, air intercepts, electronic countermeasures, electronic counter-countermeasures, combat air patrol, defense against composite force, bomber intercepts, destroy/disrupt/avoid adversary fighters, and defensive countermeasure (chaff/flare) use.	MOA, ATCAA, RA	Surface to 60,000 MSL	0.5 to 1.0 hour

Key:
AGL = Above Ground Level
ATCAA = Air Traffic Control Assigned Airspace
LRSW = Long-Range Standoff Weapon
MOA = Military Operations Area
MSL = Mean Sea Level
RA = Restricted Area

Utilized as an aggressor to the F-22, the T-38 would train jointly with the F-22 and conduct many of the same training activities, including airspace use and night sorties. The F-22s and T-38s fly missions lasting one and one-half to two hours including takeoff, transit to and from the training airspace, training activities, and landing. Depending upon the distance and type of training activity, the F-22 and T-38s would spend between 30 and 60 minutes in a training airspace. On occasion, during an exercise, the F-22 would spend up to 90 minutes in one or a set of airspace units. The F-22 would spend 75 percent of its time operating above 30,000 feet MSL, but could operate as low as 500 feet AGL and as high as Flight Level (FL) 600 (nominally 60,000 feet MSL). The T-38 would operate up to 35,000 feet MSL and would rarely fly below 5,000 feet AGL. F-22s would use the authorized limits of each airspace unit. The F-22 would rarely (5 percent or less) fly below 5,000 feet AGL and would primarily fly above 30,000 feet MSL (Table 2–5). Actual flight altitudes within the airspace would depend upon the lower and upper limits of specific airspace units.

Table 2–5. F-22 and T-38 Altitude Use

Altitude (feet)	Percent of Flight (Hours)		
	F-15	F-22	T-38
>30,000 MSL	8%	70%	14%
10,000-30,000 MSL	67%	25%	81%
5,000 AGL-10,000 MSL	14%	3%	3%
2,000-5,000 AGL	8%	1.5%	1.5%
1,000-2,000 AGL	2.75%	0.25%	0.25%
500-1000 AGL	0.25%	0.25%	0.25%

Key: AGL = Above Ground Level; MSL = Mean Sea Level

The F-22 has supersonic performance without the use of afterburners. This means that F-22 pilots could attain supersonic speeds in the course of normal maneuvering without employing a separate procedure (i.e., lighting the afterburner) and would employ supercruise to train to the full capabilities of the aircraft. Supersonic operations are not authorized in the MOAs nor the Carrabelle or Compass Lake Work Areas. The F-22 would conduct supersonic operations in the warning areas. The T-38 would not conduct supersonic operations in training with the F-22s.

2.3.1 F-22 and T-38 Training Flights within Airspace

The current sortie-operations in Tyndall AFB airspace and overwater warning areas, which comprise the primary airspace, are presented in Table 2–6. The F-22 training squadron uses the Tyndall MOAs, Carrabelle and Compass Lake Work Areas, and associated ATCAAs for 53 percent of their training sortie-operations. The warning areas in the Gulf of Mexico are used for 47 percent of their training sorties. Table 2–6 compares existing MOA training of the F-22 training squadron with the proposed training activity of the F-22 operational squadron and the T-38 detachment. Airspace units that were identified as primary airspace would be used regularly by the proposed F-22s and T-38s providing most of the airspace necessary to fulfill their training requirements. Secondary airspace would be used on an as-needed basis in the event that primary use airspace is unavailable. Combined total sortie-operations by the proposed F-22s and T-38s in individual secondary airspace units would be expected to be less than 75 per year. Therefore, secondary airspace is evaluated qualitatively in this EA.

A SORTIE-OPERATION IS THE USE OF ONE AIRSPACE UNIT BY ONE AIRCRAFT.

The F-22 and T-38 aircraft do not train in MTRs and they are not projected to do so with current missions. F-22 and T-38 training does include incidental training in the Moody 3 MOA (Figure 2–2).

Table 2–6. Baseline and Proposed Annual Sortie-Operations

Airspace Unit	Floor (feet AGL)[1]	Ceiling (feet MSL)[1]	Baseline/No Action Alternative [2]			Proposed Action			Alternative 1		
			F-22[3]	T-38	Other [4]	F-22[5]	T-38	Other [4]	F-22[5]	T-38	Other [4]
PRIMARY AIRSPACE											
Tyndall MOAs	300	UTBNI 18,000	3,806	0	16,617	6,196	1,851	10,700	6,196	927	10,700
Compass Lake Work Area	9,000	UTBNI 23,000	534	0	1,897	1,698	900	915	1,698	450	915
Carrabelle Work Area	9,000	UTBNI 37,000	657	0	2,334	2,903	1,738	1,125	2,903	869	1,125
W-470	Surface	Unlimited	4,165	0	10,938	7,237	2,414	4,221	7,237	1,207	4,221
W-151	Surface	Unlimited	1,375	0	3,610	3,642	1,781	1,393	3,642	891	1,393

Notes:

[1] Subsets of the Tyndall MOAs have varying floors and ceilings. The lowest floor and highest ceiling are listed. Tyndall B and H MOAs extends from 9,000 feet AGL UTBNI 18,000 feet MSL; Tyndall C and D MOAs extend from 300 feet AGL UTBNI 6,000 feet MSL. Tyndall E and F MOAs extend from 300 feet AGL UTBNI 18,000 feet MSL. Tyndall G MOA extends from 1,000 feet AGL UTBNI 18,000 feet MSL.

[2] Baseline sortie operations counts are from FY08; F-35 sortie operations flown from Eglin AFB were added, as per in the ROD and Final EIS for the Implementation of BRAC 2005 Decisions for JSF ITC, Eglin AFB, Florida, 5 February 2009 (Air Force 2009); F-35 sortie operations were scaled down to reflect beddown of 59 PAA.

[3] Numbers in this column are for 1 F-22 training squadron (28 primary aircraft).

[4] Other aircraft category includes F-35s to be stationed at Eglin AFB F-35 EIS (Air Force 2009) as well as F-15s, QF-4s, and various transient aircraft.

[5] Numbers in this column are for one F-22 training squadron (28 primary aircraft) and one F-22 operational squadron (21 primary aircraft).

Key:

AGL = Above Ground Level
BRAC = Base Realignment and Closure
EIS = Environmental Impact Statement
FY = Fiscal Year
ITC = Integrated Training Center
JSF = Joint Strike Fighter
MSL = Mean Sea Level
MOA = Military Operations Area
ROD = Record of Decision
UTBNI = up to but not including

2.3.2 Air-to-Ground and Air-to-Air Training

F-22 pilots spend approximately 80 percent of their training in air-to-air missions and 20 percent of their training in air-to-ground missions. Most air-to-ground training would be simulated, where no munitions would be released from the aircraft. The F-22s use avionics to simulate ordnance delivery on a target. This type of training could be conducted in any of the airspace units and would not require an air-to-ground range.

Air-to-ground training also includes ordnance delivery training, which would be conducted within an approved range. Table 2–7 presents the current and projected F-22 air-to-ground munitions used in training. The primary air-to-ground ordnance carried by the F-22 is the Guided Bomb Unit (GBU)-32, and would include the Small Diameter Bomb (SDB) (GBU-39/B). The GBU-32 is a 1,000-pound equivalent variant of the Joint Direct Attack Munition (JDAM). JDAMs are guided to the target by an attached Global Positioning System (GPS) receiver. SDBs are guided 250-pound equivalent munitions. Only inert JDAMs and SDBs would be employed by the F-22 operational squadron. Employment of these weapons requires an authorized range with restricted airspace. The F-22 operational squadron is expected to use the NTTR for this training as the range and airspace is available.

The F-22's air-to-air training does require gunnery training using the 20mm cannon. The F-22s would utilize inert 20mm training practice rounds against a towed target. These training events would be conducted within W-470 and W-151, which are the same airspace units in which the F-22 training squadron conducts air-to-air training (Air Force 2000).

Table 2–7. Current and Projected Annual Training Munitions

Training Munitions Class	Current F-22 Training Squadron*	F-22 Operational Squadron	Total Projected F-22
Air-to-Air			
20 mm	32,876	19,833	52,709
Air-to-Ground			
GBU-32 JDAM	183	29	212
GBU-39 SDB	0	116	116

Note: *Prorated for the current F-22 training squadron from amounts listed in the *Environmental Impact Statement for the Conversion of Two F-15 Fighter Squadrons to Two F-22 Fighters Squadrons*, May 2000 (Air Force 2000)

Key:
GBU = Guided Bomb Unit
JDAM = Joint Direct Attack Munition
mm= millimeters
SDB = Small Diameter Bomb

Table 2–7 presents the current and projected annual training munitions use. For both the Proposed Action and Alternative 1, the T-38 aircraft would not employ any munitions; therefore, the amounts shown in Table 2–7 represent munitions use by only the F-22 aircraft assigned to Tyndall AFB.

2.3.3 Defensive Countermeasures

Table 2–8 presents the F-22 existing and proposed defensive chaff and flare use. The T-38 would not deploy chaff or flares. Flares are authorized in all of the primary airspace. Chaff is not authorized in the Tyndall MOAs or the Carrabelle/Compass Lake Work Areas; therefore, it would not be deployed.

Table 2–8. Current and Projected F-22 Annual Chaff and Flare Use

Aircraft	Current F-22 Training Squadron*	F-22 Operational Squadron	Total Projected F-22
Chaff Bundles (RR-188)	127,688	10,450	138,138
Flares (MJU-10/B)	63,843	6,533	70,376

Note: *Prorated for the current F-22 training squadron from amounts listed in the *Environmental Impact Statement for the Conversion of Two F-15 Fighter Squadrons to Two F-22 Fighters Squadrons, May 2000* (Air Force 2000)
Key:
MJU = Multi Jettison Unit

2.4 Alternative 1 – Beddown 21 F-22 and 10 T-38 Aircraft

Under Alternative 1, 21 F-22 primary aircraft and only 10 T-38 primary aircraft would beddown at Tyndall AFB. The Air Force estimates that the F-22 operational squadron would conduct 4,032 sorties per year and the 10 T-38s would conduct 1,560 sorties per year. Airfield operations and sortie-operations under Alternative 1 are listed in Table 2-2 and Table 2-6, respectively. Construction activities would be the same as those described under the Proposed Action in Section 2.1.2, Table 2–3, and Figure 2–1.

Personnel changes under Alternative 1 would be the same as those under the Proposed Action. Fourteen contract personnel would come to Tyndall AFB to support the T-38 maintenance and would be required despite the reduction in the number of T-38 aircraft between the Proposed Action and Alternative 1. Dedicated T-38 pilots and dual qualified F-22/T-38 pilots would operate the T-38s. The T-38s would not deploy chaff, flares, or ordnance as described in Section 2.3.2. Therefore, munitions use of the F-22s under Alternative 1 would be the same as described under the Proposed Action in Table 2–7 and Table 2–8.

2.5 Alternatives Considered but Not Carried Forward

Locate the F-22 Operational Squadron at Another Base with an existing F-22 mission - In July 2010, the Secretary of the Air Force approved Program Change Request 11-01 to consolidate the F-22 fleet to enhance operational flexibility and maximize aircraft availability for contingencies. The most efficient and cost effective locations to consolidate the F-22 fleet are strategic locations which currently host F-22 aircraft and have the infrastructure and capacity to host additional aircraft. The Air Force examined three of the current F-22 bases to accept additional aircraft: JBER, Alaska; Joint Base Langley-Eustis, Virginia; and Tyndall AFB, Florida. Each base was examined to determine the number of aircraft, which could be accommodated. The Air Force determined that one F-22 squadron from Holloman AFB would be distributed between JBER and Joint Base Langley-Eustis. With the departure of the F-15 squadrons creating excess capacity and available infrastructure to support the F-22 aircraft, the Air Force proposed that the second squadron from Holloman AFB would be relocated to Tyndall AFB.

Alternate Locations of MAC Pad and Privately Owned Vehicle (POV) Parking - Tyndall AFB examined possible locations for the MAC pad and POV parking that would maximize operational purposes and minimize disturbance of the wetlands surrounding the MSA. One alternative considered, but not carried forward, located the MAC pad and POV parking along the Alternate Egress Road considered in Alternative 1. This siting was dismissed because the distance from the main MSA meant the location was not operationally viable. Additionally, to support the equipment and vehicles necessary to support the MAC pad, the Egress Route

would need to be a paved road two lanes wide and would require additional disturbance of the surrounding wetlands.

Another alternative location for the MAC pad and POV parking was located along Ammo Road. This alternative siting would have required construction of two new roads from the MSA area near the chaff and flare storage to the southeastern portion of the proposed MAC pad and POV parking. The Air Force determined that this siting alternative would not minimize disturbance to wetlands and determined not to carry the alternative locations forward for analysis.

Alternate Location of MSA Egress Route – The Air Force considered locating an alternate MSA egress route using an existing forestry road extending from the northeastern portion of the MSA for 5,738 feet. The road would have been extended another 900 feet to connect with the flightline road system. The Air Force dismissed this alternative because this siting of the egress route did not represent the minimal amount of wetlands disturbance.

2.6 No Action Alternative

Under the No Action Alternative, the F-22 operational squadron and the T-38 detachment would not beddown at Tyndall AFB. Tyndall AFB would continue to support the F-22 training squadron as well as the other training aircraft such as the QF-4. No construction activities or personnel changes related to the F-22 operational squadron or T-38 detachment would take place. Airfield operations and sortie-operations would continue under current conditions, which reflect Tyndall AFB without the F-15 squadrons. As discussed in Section 2.2.1, flight activities at Tyndall AFB under the No Action alternative were estimated using available data under baseline conditions and removing the activities conducted by the F-15 squadrons.

2.7 Environmental Impact Analysis Process (EIAP)

EIAP, in compliance with NEPA guidance, includes public and agency review of information pertinent to the Proposed Action and provides a full and fair discussion of potential consequences to the natural and human environment.

2.7.1 Public and Agency Input

The Air Force initiated early public and agency involvement in the environmental analysis of the proposed beddown of the 21 primary F-22s and 20 primary T-38s. Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) letters were sent and responses received through March 2011. IICEP letters were also sent to eight federally recognized tribes to initiate Section 106 consultation. Appendix A includes samples of the IICEP letters sent by the Air Force with a mailing list of recipients as well as the letters received by the Air Force.

In late May 2011, the Draft EA was released for a 30-day public comment period. Copies of the Draft EA were distributed to IICEP recipients as well as the Bay County Public Library and the Tyndall AFB Library for public access. An electronic copy of the Draft EA was also posted on the Tyndall AFB website at www.tyndall.af.mil. A Notice of Availability was published in the

News Herald on May 29, 2011 notifying the public of the Draft EA and initiating the public comment period. No comments were received from members of the public. The Georgia and Florida State Clearinghouses indicated no comments on the Draft EA. The Florida Division of Historical Resources indicated the Draft EA adequately addressed cultural resources. Appendix A includes the published Notice of Availability and comment letters on the Draft EA received during the public comment period.

Hard copies of the Draft EA were provided via certified mail to the federally recognized tribes contacted during the IICEP process. Tyndall AFB then followed up with the Native American tribes through email and certified letters to ensure the Draft EA had been received and request any comments or concerns be identified. The Air Force received a written response from the Seminole Tribe of Florida indicating the tribe had no comments. A representative of the Miccosukee Tribe of Indians of Florida contacted Tyndall AFB by phone indicating the tribe had no comments on the Draft EA and would not provide written concurrence. The letter from the Seminole Tribe and a summary of the verbal comments from the Miccosukee Tribe are included in Appendix A. No other responses were received from the Native American tribes.

2.8 Regulatory Compliance

This EA has been prepared to satisfy the requirements of NEPA (Public Law [P.L.] 91-190, 42 USC 4321 *et seq*.) as amended in 1975 by P.L. 94-52 and P.L. 94-83. Congress enacted NEPA to establish a national policy for the protection of the environment. Specifically, the regulation requires federal agencies to assess the environmental consequences of a Proposed Action and alternatives systematically as part of the decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed decisions by the decision maker. The President established the CEQ under NEPA to implement the provisions of the Act and review and appraise federal programs and activities in light of NEPA policy. The CEQ promulgated regulations for implementing the procedural provisions of NEPA (40 CFR 1500-1508). This EA has been prepared by the Air Force in accordance with the requirements of NEPA of 1969, CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR §§ 1500-1508), and 32 CFR 989, *et seq*., *EIAP* (formerly promulgated as AFI 32-7061). In addition to complying with NEPA, Table 2–9 presents other review and permits required if the proposed beddown were implemented.

Table 2–9. Review and Permits Required for Implementation of the Proposed Beddown

Review/Permit Required	Responsible Agency(ies)	Action Requiring Analysis, Permit Review, and/or Permit
The Clean Air Act	Air Force/Appropriate state environment departments	Federal action (i.e., change in aircraft or construction) potentially changing air emissions. Bay County and Tyndall AFB are in attainment for all criteria pollutants. Therefore, no Air Conformity Review under the Clean Air Act (CAA) amendments is required.
Endangered Species Act (ESA)	U.S. Fish and Wildlife Service (USFWS)	Federal action with potential to affect species that are federally listed as threatened and endangered, and for the conservation of habitats that are critical to the continued existence of those species.
National Historical Preservation Act (NHPA) Section 106	Consultation with State Historic Preservation Office (SHPO), Tribal Historic Preservation Office (THPO), and Notification to Advisory Council on Historic Preservation (ACHP)	Renovation of structure within a historic district. Potential overflight consequences to historic properties or cultural resources.

2.9 Environmental Comparison of the Proposed Action and Alternatives

Table 2–10 compares the environmental consequences by resource of the proposed beddown of 21 primary F-22 aircraft and 20 T-38 aircraft at Tyndall AFB. In addition, Table 2–10 summarizes the consequences at Tyndall AFB of implementing the Proposed Action, Alternative 1, and the No Action Alternative. This summary is derived from the detailed analyses presented in Chapter 4.

Chapter 5 addresses cumulative consequences and finds that there are no significant cumulative environmental consequences resulting from an F-22 and T-38 beddown decision when added to other past, present, or reasonably foreseeable future federal and non-federal actions.

Table 2–10. Summary of Impacts by Resource

Resource	Proposed Action	Alternative 1	No Action Alternative
Airspace Management and Use	The F-22 and T-38 aircraft would be utilizing the same airspace as the current Tyndall AFB aircraft. The additional aircraft would create additional airfield ATC operations over current traffic count but it is not anticipated to go above levels that Tyndall AFB has accommodated in the recent past. The total use of the Tyndall MOAs and W-470 would decrease by approximately 8 percent as compared to baseline conditions. Use of the Carrabelle and Compass Lake Work Areas would increase by over 92 percent and 44 percent, respectively. Use of W-151 would increase by nearly 37 percent. The new F-22s and T-38s are proposed to use airspace that would also be used by the new F-35s at Eglin AFB, particularly in W-151. The 325 FW units are given priority scheduling in the airspace units scheduled by Tyndall AFB, which include the Tyndall MOAs, the Carrabelle Work Area, and the Compass Lake Work Area. It is expected that Tyndall AFB would schedule the airspace to the extent required to meet the training needs of the F-22 operational squadron, the T-38 detachment, and other 325 FW units. Coordinated scheduling between the 325 FW and the 46 TW at Eglin AFB would ensure demand for these airspace units would not exceed capacity to the extent possible. No significant impact is anticipated.	Alternative 1 impact would be similar to those under the Proposed Action. There would be fewer T-38 operations; however, F-22 operations would remain the same as the Proposed Action. It is expected that Tyndall AFB would schedule the airspace to the extent required to meet the training needs of the F-22 operational squadron, the T-38 detachment, and other 325 FW units. Coordination between the 325 FW and 46 TW would ensure demand for the airspace units would not exceed capacity to the extent possible. No significant impact is anticipated.	Under the No Action Alternative, no additional F-22 or T-38 aircraft would beddown at Tyndall AFB. The number of ATC operations would continue at current levels. The demand for Special Use Airspace (SUA) would remain unchanged over current levels.
Noise	Total area exposed to noise exceeding 65 L_{dn} in the City of Parker, Panama City, and the City of Callaway would increase by 107 acres relative to baseline conditions, but the number of acres in unincorporated portions of Bay County exposed to noise exceeding 65 L_{dn} would decrease by 190 acres. The number of off-installation residents exposed to noise levels greater than 65 L_{dn} would increase from 593 under baseline conditions to 786 under the Proposed Action. Persons exposed to increased noise levels would be more likely to become annoyed by the noise. The frequency of speech interference at the several representative noise-sensitive locations studied would decrease slightly, except at Parker Elementary School, where the number would increase from 2 per hour to 3 per hour with windows closed. The probability of sleep disturbance at residential locations studied would remain approximately the same as under baseline conditions, with changes ranging an increase of 1 percent to a decrease of 3 percent under windows open and windows closed scenarios. Existing aircraft noise-related hearing loss concerns in areas on Tyndall AFB would be reduced, as fewer structures would be exposed to noise levels at or exceeding 80 L_{dn}, the noise level at which populations are at the greatest risk of hearing loss. Noise levels generated by subsonic operations in MOAs would result in changes of less than 1 dB L_{dnmr} relative to baseline conditions. Supersonic operations in the offshore warning areas would result in an increase of 3 dB L_{cdn} in W-151 and a decrease of 1 dB L_{cdn} in W-470. Overall, it is not expected that noise impacts associated with implementation of the Proposed Action would be perceived as significant.	Noise impacts would be similar to impacts under the Proposed Action. In the City of Parker, Panama City, and the City of Callaway, 106 additional acres of land would be affected by noise exceeding 65 L_{dn} while noise exceeding 65 L_{dn} would affect 191 fewer acres in unincorporated Bay County, as compared to baseline conditions. The number of off-installation residents exposed to noise levels greater than 65 L_{dn} would increase to 781. The average number of aircraft noise events per hour with potential to interrupt speech would decrease or remain the same at all representative locations studied except for Parker Elementary School, where the number would increase from 2 per hour to 3 with windows closed. The probability of a person being awoken at least once per night would decrease or remain the same at each of the three residential representative noise sensitive locations studied. The number of structures exposed to 80 L_{dn} would decrease resulting in a slight decrease in hearing loss risk among populations on Tyndall AFB. It is not expected that impacts would be perceived as significant. Noise impacts beneath training airspace units would be the same as under the Proposed Action. It is not expected that noise impacts would be perceived as significant.	A reduction in F-15 flying operations has resulted in reduced time-averaged noise levels near the installation as compared to the 2008 AICUZ. The amount of land area affected by noise levels greater than 65 L_{dn} in the City of Parker, Panama City, and the City of Callaway is 72 acres less and in unincorporated Bay County, the amount is 520 acres less than the 2008 AICUZ. The number of off-installation residents exposed to greater than 65 Ldn is 231. The frequency of speech interference and the probability of awakening due to aircraft noise are less at all representative locations studied and the number of structures exposed to 80 L_{dn} is less than the 2008 AICUZ noise levels. Noise levels in training airspace are less relative to baseline levels. Overall, noise impacts in the installation vicinity under the No Action Alternative would be positive and insignificant in nature.

Resource	Proposed Action	Alternative 1	No Action Alternative
Safety	There would be no change in safety conditions or personnel safety. Personnel are trained and facilities exist to handle ordnance, and defensive counter measures. The newly constructed buildings would be built in compliance with AT/FP requirements and located outside any identified Q-D arcs for explosive safety. The addition to the egress facility (Bldg 126) would breach the 7:1 Transitional Surface. Before construction can take place, an airfield waiver would need to be processed and approved by AETC or ACC depending on the timing of the construction and the major command that Tyndall AFB reports to at that time. Class A mishap and bird strike risks are expected to be proportional to the amount of training time in the airspace and not expected to be significant. Therefore, no significant impacts to ground safety, airfield safety, explosives safety, or flight safety are anticipated	Same as the Proposed Action. No significant impacts to ground safety, airfield safety, explosives safety, or flight safety are anticipated.	Continuation of current BASH, ordnance, and other safety conditions.
Air Quality	No significant impact to regional air quality is expected from the operational aspects of the Proposed Action. Additionally, while associated construction activities would generate emissions, the emissions would be temporary in nature and would not be regionally significant. Cumulative operational and construction emissions are not expected to contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS). Therefore, no regionally significant impacts are anticipated to air quality from operations or construction under the Proposed Action.	Operational and construction emissions would not cause emissions to exceed the NAAQS. No regionally significant impacts to air quality are expected from operations or construction under Alternative 1.	Regional air quality would not change from current levels under this alternative; thus, no significant impacts to air quality would occur.

Resource	Proposed Action	Alternative 1	No Action Alternative
Physical Resources	Potential impacts under the Proposed Action include temporary disturbance of up to approximately 8.12 acres of surface area due to construction, renovation, and additions to base facilities as well as the creation of some new impervious surface area. Areas immediately surrounding construction zones may also experience temporary disturbance from vehicle and equipment operations during construction. By implementing standard construction practices as needed, potential impacts to soil resources would be minimal and no significant impacts would occur due to implementation of the Proposed Action. Prior to construction, the base would be required to obtain coverage under a NPDES Construction General Stormwater Permit. As directed by the SWPPP, standard construction practices must be employed to minimize the potential for exposed soils or other contaminants from reaching surface waters during or following construction activities associated with the Proposed Action. Such standard construction practices would include the use of silt fences, covering of soil stockpiles, use of secondary containment for the temporary storage of hazardous liquids, establishment of buffer areas near intermittent streams, and revegetation of disturbed soils that would not be paved or covered by structures in a timely manner. In addition, projects associated with the Proposed Action involving the disturbance of more than 5,000 square feet (0.1 acres) would be required to employ measures necessary to adhere to Section 438 of the EISA. Adherence to the requirements of the NPDES construction permit, the SWPPP, and Section 438 of the EISA would minimize impacts to water resources during construction, resulting in a minor impact. Therefore, with implementation of standard construction practices as needed, potential impacts to physical resources would be minimal and no significant impacts would occur due to implementation of the Proposed Action.	Construction activities and the amount of temporary disturbance proposed under Alternative 1 would be the same as those under the Proposed Action. Adherence to the requirements of the NPDES construction permit, the SWPPP, and Section 438 of the EISA would minimize impacts to water resources during construction, resulting in a minor impact. Therefore, with implementation of standard construction practices as needed, potential impacts to physical resources would be minimal and no significant impacts would occur due to implementation of Alternative 1.	No construction or renovation activities associated with the F-22 or T-38 beddown would occur. Physical Resources would remain unchanged from the conditions described in Section 3.5.

Resource	Proposed Action	Alternative 1	No Action Alternative
Biological Resources	Terrestrial Biological Resources - Construction activities under the Proposed Action would likely displace wildlife species from the immediate area. No threatened and endangered species have been documented at the proposed site. Habitat for the Gulf salt marsh snake lies adjacent to a portion of the proposed construction area. Implementation of the standard construction practices discussed in the Wetlands section would minimize potential indirect impacts to the salt marsh snake and its habitat from drainage and pollution. Therefore, the Proposed Action would have no significant impacts on the Gulf salt marsh snake and its habitat. Approximately 0.63 acres of wetlands would be directly impacted by construction activities. Prior to any ground disturbing activities, a jurisdictional delineation from the USACE and in accordance with FDEP guidance would be performed for sited construction projects. If jurisdictional wetlands were identified in any of the construction areas, a CWA Section 404 permit through USACE for discharges to waters of the U.S. would be required. During the final design and application for a Section 404 permit Tyndall AFB would develop a formal plan in coordination with USACE, FDEP, and NWFWMD to replace the loss of any wetlands with new, same quality wetlands construction or restoration in a suitable location on the base. Aircraft noise from the Proposed Action would not be expected to pose a novel or new threat to birds and wildlife that would cause adverse reactions, other than temporary flight, and are not expected to affect any threatened or endangered species populations adversely. Therefore, no significant impacts to terrestrial biological resources would occur from construction activities or air operations under the Proposed Action. Marine Biological Resources - There would be no significant impacts to marine biological resources under the Proposed Action. Noise produced during subsonic and supersonic flights would not substantially affect marine mammals, sea turtles, or birds. Water quality and bottom habitats would not be substantially impacted from chemical materials, metal residues, or other residual materials deposited into the water. The likelihood that animals near the surface would be struck by falling objects is low. With implementation of standard construction practices, construction activities would not degrade estuarine or marine habitats.	Terrestrial Biological Resources - Construction activities under Alternative 1 would be the same as those discussed under the Proposed Action; therefore, potential impacts to wildlife and vegetation, threatened, endangered, and special status species/communities, and wetlands would be the same as those discussed under the Proposed Action. Potential impacts to wildlife from aircraft operations under Alternative 1 would be the same as those discussed under the Proposed Action. Therefore, no significant impacts to terrestrial biological resources would occur from construction activities or air operations. Marine Biological Resources - There would be no significant impacts to marine biological resources under Alternative 1. Potential impacts due to noise, water quality alteration, residual materials, direct physical impacts, and construction activities would be similar to the Proposed Action, although less noise might be produced due to fewer T-38 aircraft.	Terrestrial Biological Resources Tyndall AFB would continue to manage its natural resources in accordance with state and federal regulations under either an action or a no-action decision. No-action would not pose additional affects to threatened, endangered, and special status species/communities, including wetlands. Biological resources would continue to be affected by normal operations associated with an active Air Force base. Marine Biological Resources - Potential impacts to marine biological resources due to noise, water quality alteration, residual materials deposition, and direct physical impacts would remain the same as those existing under current conditions. Construction activities would not take place, and there would therefore be no potential for construction-related impacts to water quality and the associated issues related to marine species. There would be no significant impacts to marine biological resources resulting from the No Action Alternative.

Resource	Proposed Action	Alternative 1	No Action Alternative
Cultural Resources	No adverse effects to cultural resources are expected from implementation of the Proposed Action. The Area of Potential Effect (APE) was previously surveyed for cultural resources. One structure, Building 156 or Hangar #3, is eligible for the National Register of Historic Places. On June 14, 2011, the Florida Division of Historical Resources concurred with the Air Force determination of no adverse effects to this property from the proposed action or alternative 1. Eight federally recognized Native American tribes were contacted regarding the Draft EA. Of the tribes contacted, the Miccosukee Tribe of Indians of Florida verbally concurred with the proposed beddown with no objections. The Seminole Tribe of Florida provided a written letter indicating no comments on the proposed beddown. No responses were received from the remaining tribes. Based on the SHPO concurrence and results of tribal coordination, no significant impacts to cultural resources are anticipated with the implementation of the Proposed Action.	No adverse effects to cultural resources are expected from implementation of Alternative 1. Effects would be similar to those described for the Proposed Action.	Under the No Action Alternative, the Air Force would not implement the proposed project activities and as a result, no adverse effects to cultural resources would occur.

Resource	Proposed Action	Alternative 1	No Action Alternative
Land Use	Proposed construction and renovation projects would be constructed near compatible land uses that also maximize operational functions. The construction of a deployment-processing center would necessitate the change of the site's current land use classification from open space to aircraft operations and maintenance. Land use classifications near this site would be compatible with the change to the aircraft operations and maintenance classification. Two new munitions igloos are required by safety regulations and the need to consolidate munitions igloos inside the existing MSA, there are no practicable alternative locations available outside of the MSA. The only available site within the MSA is partially within the 100-year floodplain. To comply with the Federal Coastal Zone Management Act, a consistency determination is included in Appendix C. A letter dated July 21, 2011 from the Florida Department of Environmental Protection determined the proposed activities are consistent with the Florida Coastal Management Program. Final concurrence would be determined during the environmental permitting process in accordance with Section 373.428, *Florida Statutes*. The alternate MSA egress route would extend into the airfield Clear Zone but would not present a risk to aircraft or project into the imaginary surface. Therefore, no airfield waiver would be required. The existing road network is expected to have the capacity to handle the additional personnel as the personnel change is not expected to exceed historic levels. Noise levels would affect 746 acres off-base with noise levels greater than 65 dB L_{dn}. These off-base areas include portions of the cities of Parker, Callaway, Panama City, and unincorporated Bay County and include residential, commercial, and mixed-use land use categories. These land uses are compatible with noise levels less than 75 L_{dn} with the incorporation of noise attenuation. Individuals exposed to these aircraft noise levels may experience annoyance; however, changes in land use are not expected. Construction activities and noise levels are not expected to affect outdoor recreation. Noise levels in the primary use airspace would be comparable to baseline noise levels and would not be expected to affect land uses, recreation activities, or special land use areas. Therefore, no significant impacts to land use due to construction activities, changes in traffic volumes, or noise levels are anticipated under the Proposed Action.	Potential impacts under Alternative 1 are similar to those described under the Proposed Action. Construction activities would be the same as those under the Proposed Action. Potential impacts to the road network and traffic volumes would be the same as those under the Proposed Action. Noise levels and resulting impacts to land use compatibility and recreation would be near the airfield and below the primary airspace would be similar to or less than those described under the Proposed Action. Therefore, no significant impacts to land use resulting from construction activities, changes in traffic volumes, or noise levels are anticipated under Alternative 1.	Under the No Action Alternative, no construction activities would occur and noise levels would be less than the noise levels published in the 2008 AICUZ. Land use, recreation, and traffic volumes would remain the same as current levels.

Resource	Proposed Action	Alternative 1	No Action Alternative
Socioeconomics	Under the Proposed Action, there would be no anticipated significant impacts to socioeconomics. There would be temporary and minor benefits to local employment related to construction and renovation activities, which would last for the duration of the projects. The number of incoming personnel associated with the beddown of the F-22 squadron and the T-38 detachment would not exceed the number of personnel stationed at Tyndall AFB in recent years. Therefore, the overall change in population within the ROI would likely be negligible and would not be anticipated to represent a significant change in population or public services. The direct and indirect jobs created due to the beddown would most likely be negligible when considered with the recent loss of direct and indirect jobs associated with the drawdown of the F-15 at Tyndall AFB. The local housing market would be able to provide sufficient housing units for the incoming personnel with no adverse effects on the local housing market and the school districts would be anticipated to have the capacity to accommodate the increase in students without impacting school resources. Therefore, no significant impacts are anticipated from the construction activities or the personnel changes. The number of off-base residents affected by noise levels greater than 65 dB DNL under the Proposed Action would increase from 593 persons under baseline conditions to 786 persons. While the number of persons annoyed by the noise levels would increase, the noise levels would not exceed levels that required changes to economic decisions or other socioeconomic factors and would therefore not be anticipated to result in a significant impact.	Under Alternative 1, construction activities and personnel changes would be the same as those described in Section 2.1 and therefore, would result in similar construction related impacts to socioeconomic resources as described under the Proposed Action in Section 4.9.2. Therefore, no significant impacts from construction activities or personnel changes are anticipated. The number of off base residents affected by noise levels greater than 65 dB DNL would increase from 594 persons under baseline conditions to 782 persons under Alternative 1. While the number of persons annoyed by the noise levels would increase, the noise levels do not exceed levels that would require changes to economic decisions or other socioeconomic factors and therefore, no significant impacts are anticipated to socioeconomic resources under Alternative 1.	Under the No Action Alternative, the Air Force would not beddown an operational F-22 squadron and a T-38 detachment. The Air Force would not perform any construction and renovation of facilities at Tyndall AFB under this alternative. As a result, socioeconomic resources such as population, employment, housing, and school enrollment would continue below historic levels at Tyndall AFB. The number of off base residents affected by noise levels greater than 65 dB DNL is a decrease from 594 persons in the 2008 AICUZ to 232 persons.

Resource	Proposed Action	Alternative 1	No Action Alternative
Environmental Justice	Under the Proposed Action, no disproportionately high and adverse human health or environmental effects have been identified to minority or low-income populations due to construction activities at Tyndall AFB. Construction and renovation activities would occur within the boundaries of Tyndall AFB and would not impact off-base populations. Flight operations from the F-22 and T-38 training missions would not present a disproportionately high and adverse environmental effect to minority or low-income populations since the share of affected populations of concern is comparable to the populations of concern in Bay County. Under the Proposed Action, noise levels at Tyndall Elementary would remain the same relative to baseline conditions. Therefore, implementation of the Proposed Action would have the same impact to children as under baseline conditions. Noise levels at Parker Elementary would remain below 65 L_{dn}. In addition, noise levels in the training airspace under the Proposed Action would not generate disproportionately high and adverse human health or environmental effects impacting minority populations, low-income populations, or children living under the airspace since the noise levels generated in these airspace units under all of the scenarios remain comparable to noise levels under baseline conditions. Therefore, no significant impacts are anticipated regarding environmental justice under the Proposed Action.	Under Alternative 1, no disproportionately high and adverse human health or environmental effects have been identified to minority or low-income populations due to construction activities at Tyndall AFB. Construction and renovation activities would occur within the boundaries of Tyndall AFB and would not impact off-base populations. Flight operations from the F-22 and T-38 training missions would not present a disproportionately high and adverse environmental effect to minority or low-income populations since the share of affected populations of concern is comparable to the populations of concern in Bay County. Under Alternative 1, the noise levels at Tyndall Elementary would remain the same relative to baseline conditions. Therefore, implementation of Alternative 1 would have the same impact to children as under baseline conditions. Noise levels at Parker Elementary would remain below 65 L_{dn}. In addition, noise levels in the training airspace under Alternative 1 would not generate disproportionately high and adverse human health or environmental effects impacting minority populations, low-income populations, or children living under the airspace since the noise levels generated in these airspace units under all of the scenarios would remain comparable to noise levels under baseline conditions. Therefore, no significant impacts are anticipated to environmental justice areas of concern under Alternative 1.	Under the No Action Alternative, there would be no construction related impacts to minority or low-income populations. No disproportionately high and adverse human health or environmental effects would occur to minority or low-income populations resulting from noise. Noise levels would decrease as compared to the 2008 AICUZ and the affected populations of concern are comparable to the populations of concern in Bay County. The L_{dn} at Tyndall Elementary School is 2 dB less relative to the 2008 AICUZ noise levels. In addition, the L_{dn} at Parker Elementary School is less by 2 dB relative to the 2008 AICUZ and remains below 65 L_{dn}. Therefore, implementation of the No Action Alternative would have a lesser impact to children at these locations. In addition, noise levels in the training airspace under the No Action Alternative would not generate disproportionately high and adverse human health or environmental effects impacting minority populations, low-income populations, or children living under the airspace since the noise levels generated in these airspace units would decrease as compared to baseline conditions. Therefore, no significant impacts are anticipated to environmental justice areas of concern under the No Action Alternative.

Resource	Proposed Action	Alternative 1	No Action Alternative
Infrastructure	Sanitary sewer, potable water supply, solid waste, electrical power, and natural gas systems are currently working well within their respective capacities and would experience minimal impacts from the Proposed Action. The installation's SWPPP would be updated to reflect changes associated with the Proposed Action. As each of the components of the Tyndall AFB infrastructure would function below capacity with the implementation of the Proposed Action, there would be no significant impact.	Same as Proposed Action. As each of the components of the Tyndall AFB infrastructure would function below capacity with the implementation of Alternative 1, there would be no significant impact.	Same as current conditions
Hazardous Materials and Waste	Any insignificant increase in the level of JP-8 consumption is supportable by the current infrastructure. Any changes to the storage and transportation of fuel would need to be addressed in changes to the SPCCP. The quantity of hazardous waste generated is not anticipated to change significantly with the Proposed Action. Any additional hazardous waste generated would be managed in accordance with the installation HWMP. Construction of the deployment-processing center over site OT-027, Building 126 addition over ERP sites SS-015 and SS-026, and Building 266 addition near ERP sites SS-026 and Site 264 would require coordination with AETC or ACC for a construction waiver depending on the timing of the construction and the major command Tyndall AFB reports to at that time. Construction of new facilities may result in the discovery of undocumented contaminated soils for historical fuel spills. Any potential impacts associated with unknown contamination would be mitigated through worker awareness and safety training. Additional costs and delays may be associated with siting on a contaminated area. Increased costs may be incurred associated with handling/disposal of contaminated soils and/or groundwater, if necessary. Additional worker precautions and a site-specific health and safety plan approved by a Certified Industrial Hygienist would be required by the waiver. The renovation of existing structures may result in the discovery of asbestos containing materials. Asbestos would be managed in accordance with the installation Asbestos Management and Operations Plan (Air Force 2003). Since implementation of the Proposed Action would not materially change the amount of hazardous wastes generated at Tyndall AFB, no significant impacts are anticipated. No significant impacts in regards to ERP sites or toxic substances are anticipated with appropriate waivers and surveys completed.	Same as Proposed Action. Since implementation of Alternative 1 would not materially change the amount of hazardous wastes generated at Tyndall AFB, no significant impacts are anticipated. No significant impacts in regards to ERP sites or toxic substances are anticipated with appropriate waivers and surveys completed as described in Section 4.12.	Same as current conditions

Key:

325 FW = 325th Fighter Wing
46 TW = 46th Test Wing
ACC = Air Combat Command
AETC = Air Education Training Command
AFB = Air Force Base
AICUZ = Air Installation Compatible Use Zones
APE = Area of Potential Effect
AT/FP = Anti-Terrorism/Force Protection
ATC = Air Traffic Control
BASH = Bird/Wildlife-Aircraft Strike Hazard
dB = decibel
DNL = Day–Night Average Sound Level
EA = Environmental Assessment
EISA = Energy Independence and Security Act
ERP = Environmental Restoration Program
FDEP = Florida Department of Environmental Protection
L_{dn} = Day-Night Average Sound Level
MSA = Munitions Storage Area
NAAQS = National Ambient Air Quality Standards
NPDES = Nation Pollutant Discharge Elimination System
NWFWMD = Northwest Florida Water Management District
Q-D = Quantity-Distance
ROI = Region of Influence
SHPO = State Historic Preservation Office
SPCCP = Spill Prevention, Control, and Countermeasures Plan
SUA = Special Use Airspace
SWPPP = Storm Water Pollution Prevention Plan
USACE = United State Army Corps of Engineers

3 AFFECTED ENVIRONMENT

3.1 Airspace Management and Use

This section discusses the use and management of the airspace that supports aviation activities by the 325 FW in the area around Tyndall AFB, specifically the SUA used by the Wing in support of its mission and proposed for use by the new F-22 and T-38 aircraft. The Tyndall AFB terminal area is the airspace, surface to and including FL 230, delegated to Tyndall Radar Approach Control (RAPCON) by Letter of Agreement with Jacksonville Center.

For purpose of this section, the areas include the Tyndall overland MOAs B, C, D, E, F, G, H, and combinations of MOAs and ATCAA that form Compass Lake, Carrabelle, and a combination of MOAs that form the Low Level Area (LLA). The 325th Operations Support Squadron Scheduling Office (325 OSS/OSO) schedules these areas.

Over water, SUA includes warning airspace W-470, and W-151. The office of primary responsibility for these airspaces resides with the 46th Test Wing (46 TW) Scheduling at Eglin AFB, Florida. The 46 TW delegates operational control and scheduling of W-470 to 325 OSS/OSO on a daily basis. 325 OSS/OSO may coordinate use of W-151 airspace with 46 TW as required. The 325 FW also uses Raptor North/South ATCAA that is located south of W-470 airspace and shares the northern border with W-470CEF. Raptor ATCAA use is in conjunction with at least the southern portion of the W-470 complex (W-470CEF). Raptor ATCAAs is jointly controlled by Jacksonville Center and Miami ARTCC but 325 OSS/OSOS is the primary scheduling agency. The 325 FW may also use the Moody 3 MOA/ATCAA on occasion. This airspace is located northeast and northwest of Tyndall AFB respectively and controlled by Jacksonville Center. The SUA that are proposed for use by the F-22 operational squadron and the T-38 detachment are shown in Figure 2–3.

3.1.1 Resource Definition and Applicable Laws

Airspace management is generally defined as the direction, control, and handling of flight operations in the volume of air that overlies the geopolitical borders of the U.S. and its territories. Airspace is a resource managed by the FAA, which has established policies, designations, and flight rules to protect aircraft in the airfield, en route, and in SUA areas identified for military and other government activities. Management considers how airspace is designated, used, and administered to best accommodate the individual and common needs for military, commercial, and general aviation. Due to multiple and sometimes competing demands, the FAA considers all aviation airspace requirements in relation to airport operations, federal airways, jet routes, military flight training activities, and other special needs to determine how the National Airspace System (NAS) can best be structured to satisfy all aviation users.

The proposals being assessed in this document include both controlled and uncontrolled airspaces near Tyndall AFB. SUA includes warning areas and MOAs. Warning areas are designated to separate hazardous operations from non-participating aircraft and should not be entered when in use unless approved by the controlling agency. MOAs are designed to

segregate military operations from non-participating aircraft; however, non-participating aircraft are not prevented from entering. Pilots flying in MOAs are responsible for using the "see-and-avoid" standards of flight safety. It is advisable that pilots wanting to enter the airspace contact the controlling agency for MOA activity. All SUA are plotted on aeronautical charts so all pilots are aware of their location and potential for military flight training in the airspace.

The FAA is responsible for the management of the NAS and promulgates direction for the use through FAA orders, regulations, advisory circulars, and through the CFR. Safety guidance pertaining to airspace and flight activities is also contained in Air Force documents. Guidance and direction is contained in, but not necessarily limited to, the following:

- **Federal Aviation Act of 1958 (49 USC § 106 and 49 USC Title VII, Public Law (PL) 85-726 as amended) -** This legislation created the FAA and charged the agency's administrator with ensuring the safety of aircraft and the efficient utilization for the NAS within the jurisdiction of the U.S.
- **FAA Order 7610.4M Special Operations -** This order specifies procedures for ATC planning, coordination, and services during military activities and special military operations. It also defines procedures for operating in MOAs, ATCAAs, warning areas, and other SUA.
- **FAA Order 7400.8 SUA -** This order is published yearly. It provides a list of all regulatory and non-regulatory SUA areas as well as amendments that have been issued (but not implemented) to those areas established by the FAA.
- **AFI 13-201 Airspace Management -** It provides guidance and procedures for developing and processing SUA as well as Airspace for Special Use (ASU). It covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support Air Force flight operations.
- **Tyndall AFB Instruction 11-201 (Tyndall AFB Instructions 11-201) Tyndall AFB Flying Operations -** This instruction contains local information and directives pertaining to air operations at Tyndall AFB.

3.1.2 Affected Environment

Several independent studies reveal that the challenges presented b the regional airspace utilization and congestion are growing due to changes and interactions among both military and civilian requirements. The airspace in the Northwest Florida region is heavily used by a number of military, commercial, and general aviation interests.

The Tyndall AFB terminal area is that airspace delegated to the Tyndall AFB RAPCON facility through Letters of Agreement (LOAs) with Jacksonville ARTCC to provide ATC services for arriving, departing, and aircraft that are en route. The terminal airspace extends from the surface up to and including FL 230, which is approximately 23,000 feet above MSL.

The FAA has designated Class D airspace around the Tyndall AFB runways to support airfield operations. The Class D airspace is circular with an approximate 5.4 nm radius and extends

from the surface to 2,500 feet. The Tyndall AFB control tower provides ATC services and manages air traffic into, out of, and within this airspace.

The latest available data from the Air Force Air Traffic Activity Report (FY09), shows Tyndall AFB tower conducting 114, 665 operations and Tyndall AFB RAPCON conducting 107,512 operations for a total of 222,177 operations. Tyndall AFB tower ranks as the seventh busiest tower in the Air Force for FY09. The Tyndall AFB RAPCON ranks as the tenth busiest RAPCON in the Air Force for FY09. Complex operations (tower and RAPCON) rank Tyndall AFB overall as the eighth busiest complex in the Air Force for FY09.

The other regional airport in the affected environment is the new Northwest Florida Beaches International Airport (ECP). ECP opened in May 2010 replacing the old regional airport in Panama City that was named the Bay County International Airport (PFN) that laid approximately 18 nm northwest of Tyndall AFB. ECP has Class D airspace and a single 10,000-foot runway with plans to build a shorter crossing runway. The new airport is farther away from Tyndall AFB and interactions are expected to be minimal.

3.1.2.1 Special Use Airspace (SUA)

There are many types of SUA located within the Tyndall AFB terminal area. Only those airspace units proposed for use by the F-22 operational squadron and the T-38 detachment are discussed in detail.

Warning Areas - All of the warning areas that are being used are situated over the Gulf of Mexico, but none are controlled by Tyndall AFB. The users from Tyndall AFB are scheduled to use these areas on an as-available basis. It is current practice for Eglin to release W-470 to Tyndall AFB daily for their scheduling and use. W-151 and W-470 are used for weapons firing, training flights, and reduced lighting operations. Both are of sufficient size to support training and are capable of subdivision to facilitate scheduling. The procedures for temporary release of weather deviation corridors, Lightning Corridor (located in W-151C, D, E, F, and W-470C, E, and F) and Thunder Corridor (located in W-470A, B, D, and Air Combat Maneuvering Instrumentation [ACMI] East) to Jacksonville Center are set forth by LOA. Table 2–2 in Chapter 2 describes the characteristics of the warning areas and the number of sortie-operations for all of the primary airspace units under baseline conditions as well as the Proposed Action and Alternative 1.

Raptor ATCAA North/South - Raptor ATCAA is located south of the W-470 complex and shares its northern border with W-470CEF and its southern border with W-168. Altitudes are between FL 400 and FL 600 and are used in conjunction with at least the southern portion of the W-470 complex (W-470CEF). Raptor ATCAA is owned jointly by Jacksonville Center and Miami ARTCC but 325 OSS/OSOS is the primary scheduling agency.

Florida "A" and West ATCAA - Florida "A" (FLAA) ATCAA is directly overhead Tyndall AFB from FL 240 to FL 280 and is controlled and released to Tyndall Military Radar Units (MRUs) by Jacksonville Center. It is not depicted on aeronautical charts, but is described in Letter of Agreements.

Tyndall MOAs - The Tyndall MOAs are primarily overland SUA and are relatively contiguous in both horizontal and vertical boundaries. They can be used individually or collectively to support a wide variety of training and exercise requirements. Table 3–1 presents details on the aeronautical structure of the airspace, showing the range of altitudes in the MOAs and the interrelationship of the various airspace elements.

Table 3–1. Characteristics of Tyndall MOAs

Military Operations Area (MOA)	Floor	Ceiling	Comments
Tyndall B	9,000 MSL	17,999 MSL	Compass Lake
Tyndall C	300 AGL	6,000 MSL	Tyndall LLA
Tyndall D	300 AGL	6,000 MSL	Tyndall LLA
Tyndall E	300 AGL	17,999 MSL	Tyndall LLA/Carrabelle
Tyndall F	300 AGL	17,999 MSL	Exercise Only
Tyndall G	1,000 AGL	17,999 MSL	Transit Only
Tyndall H	9,000 MSL	17,999 MSL	Compass Lake

Key:
AGL = Above Ground Level LLA = Low Level Area MSL = Mean Sea Level
Source: FAA Order 7400.8S

The lateral boundaries of Tyndall C and H MOAs overlap. The Tyndall B, C, and H MOAs are generally scheduled together to collectively constitute a training area identified as Compass Lake. The Tyndall C, D, and E MOAs have a low altitude capability. They are collectively referred to as the Tyndall LLA. The Tyndall E MOA also includes the Carrabelle work area. Detailed operating procedures governing the use of these airspace elements are contained in Tyndall AFB Instruction 11-201, *Flying Operations*.

Although not under the scheduling control of the 325 FW, some training is also accomplished infrequently in the Moody 3 MOA. This MOA is situated approximately 30 to 35 nm northeast of the Tyndall MOAs, with altitudes that extend from 8,000 feet MSL UTBNI FL 180.

3.2 Noise

3.2.1 Resource Definition and Applicable Laws

For the purpose of NEPA analysis, noise is generally defined as unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. The physical characteristics of noise, ways to quantify noise, and its impacts are described briefly here and in more detail in Appendix B.

The physical characteristics of noise (or sound) include its intensity, frequency, and duration. The magnitude of the pressure fluctuations that are perceived as sound vary widely. The logarithmic decibel scale is used to simplify expression of the wide range of pressure amplitudes.

The frequency of sound is measured in cycles per second or hertz (Hz). This measurement reflects the number of times per second the air vibrates from the acoustic energy. Low-frequency sounds are heard as rumbles or roars and high frequency sounds are heard as screeches. Sound measurement is further refined using "A-weighting". The normal human ear can detect sounds that range in frequency from about 20 Hz to 15,000 Hz; however, all sounds throughout this range are not heard equally well. Through internal electronic circuitry, some

sound meters are calibrated to emphasize frequencies in the 1,000 to 4,000 Hz range. The human ear is most sensitive to frequencies in this range and sounds measured with these instruments are termed "A-weighted" and are shown in terms of A-weighted decibels. "C-weighting" is a frequency-weighting scale that does not de-emphasize low-frequency sounds as much as the A-weighting scale. C-weighting is typically used to describe impulsive sounds such as clapping, thunder, or sonic booms that are felt as well as heard.

The duration of a noise event and the number of times noise events occur are also important considerations in assessing noise impacts. The word "metric" is used to describe a standard of measurement. As used in environmental noise analysis, there are many different types of noise metrics. Each metric has a different physical meaning or interpretation and researchers developed each metric to represent a specific set of effects from environmental noise. The metrics that support the assessment of noise from aircraft operations associated with the proposal include the Maximum Sound Level (L_{max}), the Sound Exposure Level (SEL), and the Day-Night Average Sound Levels (L_{dn}). These metrics are discussed briefly below and in detail in Appendix B.

Maximum Sound Level (L_{max}) - L_{max} defines peak noise levels. It is the highest sound level measured during a single noise event (e.g., an aircraft overflight) and is the sound actually heard by a person on the ground. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level as the aircraft recedes into the distance.

Sound Exposure Level (SEL) - L_{max} alone may not represent intrusiveness of an aircraft noise event since it does not consider the length of time that the noise persists. The SEL metric combines both of these characteristics into a single measure. It is important to note; however, that SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the total exposure of the entire event. Its value represents all of the acoustic energy associated with the event as though it was present for one second. Therefore, for sound events that last longer than one second, the SEL value would be higher than the L_{max} value. The SEL value is important since it is the value used to calculate other time-averaged noise metrics.

Peak Sound Level – Noises that are extremely sudden, such as thunder, sonic booms, or munitions detonation noise, are described as "impulsive" noises. For sonic booms, the instantaneous peak pressure is usually presented in physical units of pounds per square foot. Peak sound levels do not use either A- or C-weighting.

Time-Averaged Cumulative Day-Night Average Noise Metrics - The number of times aircraft noise events occur during a given period is an important consideration in assessing noise impacts. Two "cumulative" noise metrics that support the analysis of multiple time-varying aircraft events are L_{dn} and the Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}).

These metrics sum the individual noise events and average the resulting level over a specified length of time. Thus, L_{dn} and L_{dnmr} are composite metrics representing the maximum noise levels, the duration of the events, the number of events that occur, and the time of day during which they occur. These metrics add a 10- dB penalty to events that occur between 10:00 PM

and 7:00 AM to account for the increased intrusiveness of noise events that occur at night rather than during the daytime when ambient noise-levels are normally lower. These cumulative metrics do not represent the variations in the sound level heard. Nevertheless, they do provide an excellent measure for comparing environmental noise exposures when there are multiple noise events to be considered.

Studies of community annoyance caused by numerous types of environmental noise show that L_{dn}/L_{dnmr} correlates well with effects and Schultz (1978) showed a consistent relationship between noise levels and annoyance (Table 3–2). A more recent study reaffirmed and updated this relationship (Fidell *et al.* 1991). The updated relationship, which does not differ substantially from the original, is the current preferred form (see Appendix B). The correlation between L_{dn}/L_{dnmr} is weaker for the annoyance of individuals, which is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent variability between individuals makes it impossible to predict accurately how any individual would react to a given noise event. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using L_{dn}. Use of the L_{dn} metric to predict human annoyance to noise has been endorsed by the scientific community and governmental agencies (ANSI 1980; ANSI 1988; USEPA 1974; FICUN 1980; FICON 1992).

Table 3–2. Relationship between Annoyance and L_{dn}/L_{cdn}

Day-Night Average Sound Levels (L_{dn}) in decibels (dB)	C-Weighted Day–Night Average Sound Level (L_{cdn}) (dB)	Average Percentage of Highly Annoyed Population
55	52	3.3
60	57	6.5
65	61	12.3
70	65	22.1
75	69	36.5

Source: Fidell *et al.* 1991; CHABA 1981; Schultz 1978; and Stusnick *et al.* 1992.

Community effects from sonic booms (in the form of annoyance) correlate well with the C-weighted Day-Night Average Noise Level (L_{cdn}) (see Table 3–2). L_{cdn} is similar to L_{dn}, but uses C-weighting to account for the low frequency impulsive nature of sonic booms. Interpretation of L_{cdn} uses a slightly different relationship to annoyance with a given numeric value of L_{cdn} generally representing more annoyance than the same numeric value of L_{dn}. In this EA, L_{dn} noise levels are assumed to be A-weighted unless specifically designated as being C-weighted (L_{cdn}).

No specific legal limits apply to military noise. The threshold for significance of each type of noise impact has been estimated based on noise impact studies and government agency recommendations. In 1972, Congress passed the Noise Control Act that imposed limitations on source noise levels of several types of equipment. Since noise controls could possibly reduce the combat effectiveness of military equipment, military equipment was exempted from these requirements. For the same reason, FAA limitations on civilian aircraft noise do not apply to military aircraft.

3.2.2 Affected Environment

The Region of Influence (ROI) for noise includes the areas on/near Tyndall AFB as well as the areas beneath the training airspace that is proposed for use.

Installation - Aircraft operations are a dominant noise source on and near Tyndall AFB and are currently in a state of flux. The host unit at Tyndall AFB (325 FW) had operated one squadron of F-22 training aircraft, two squadrons of F-15 aircraft, and a variety of propeller-driven training aircraft for several years. The two squadrons of F-15 aircraft have been recently drawn down, with the last based F-15 aircraft departing the base in September 2010. This drawdown has resulted in a decrease in flying operations and noise levels at the installation. For the purposes of this analysis, baseline noise conditions reflect aircraft operations as reported in the 2008 *Air Installation Compatible Use Zone Study, Tyndall Air Force Base Florida* (Tyndall AFB 2008a). The program NOISEMAP (version 7) was used to re-calculate noise levels near Tyndall AFB based on the operational data used in the 2008 AICUZ, but also using newly available technology to account for topographic effects on noise propagation. Noise levels have been plotted in 5 dB increments from 65 L_{dn} to 85 L_{dn} (Figure 3–1).

Noise levels of 65 L_{dn} or greater mostly affect lands on Tyndall AFB and the surrounding bodies of water. Off-base land areas affected by noise levels greater than 65 L_{dn} include portions of the City of Parker as well as portions of unincorporated Bay County. Table 3–3 lists the number of acres within each noise contour interval on Tyndall AFB, in surrounding waters, in the City of Parker, the City of Callaway, and in unincorporated portions of Bay County. Approximately 593 off-installation residents are affected by noise levels at or exceeding 65 L_{dn} under baseline conditions. The affected population was estimated using 2010 U.S. Census Bureau data. Where Census blocks were divided by noise contour lines, population was pro-rated by area affected.

Table 3–3. Land Area Noise Exposures under Baseline Conditions

Location	Geographic Area (in acres) Exposed to Indicated Noise Levels in Day-Night Average Sound Levels (L_{dn})					
	65-70	70-75	75-80	80-85	>85	Total
Tyndall AFB	5,657	6,378	5,370	2,319	1,705	21,429
Open Water	28,192	10,910	2,140	368	0	41,610
City of Callaway	19	0	0	0	0	19
City of Parker	103	37	0	0	0	140
Unincorporated Bay County	534	119	17	0	0	670
Total	**34,505**	**17,444**	**7,527**	**2,687**	**1,705**	**63,868**

To provide a more complete description of current noise conditions, noise analyses were run at several representative noise-sensitive locations. The L_{dn} at these locations are presented in

Table 3–4 along with other measures of current noise levels. Tyndall AFB dorms and Tyndall Elementary School, both of which are located on Tyndall AFB, are currently at 80 L_{dn}, while the City of Parker is at 72 L_{dn}, The Wood Manor housing area is at 68 L_{dn}, and the First Baptist Church of Parker is at 60 L_{dn}.

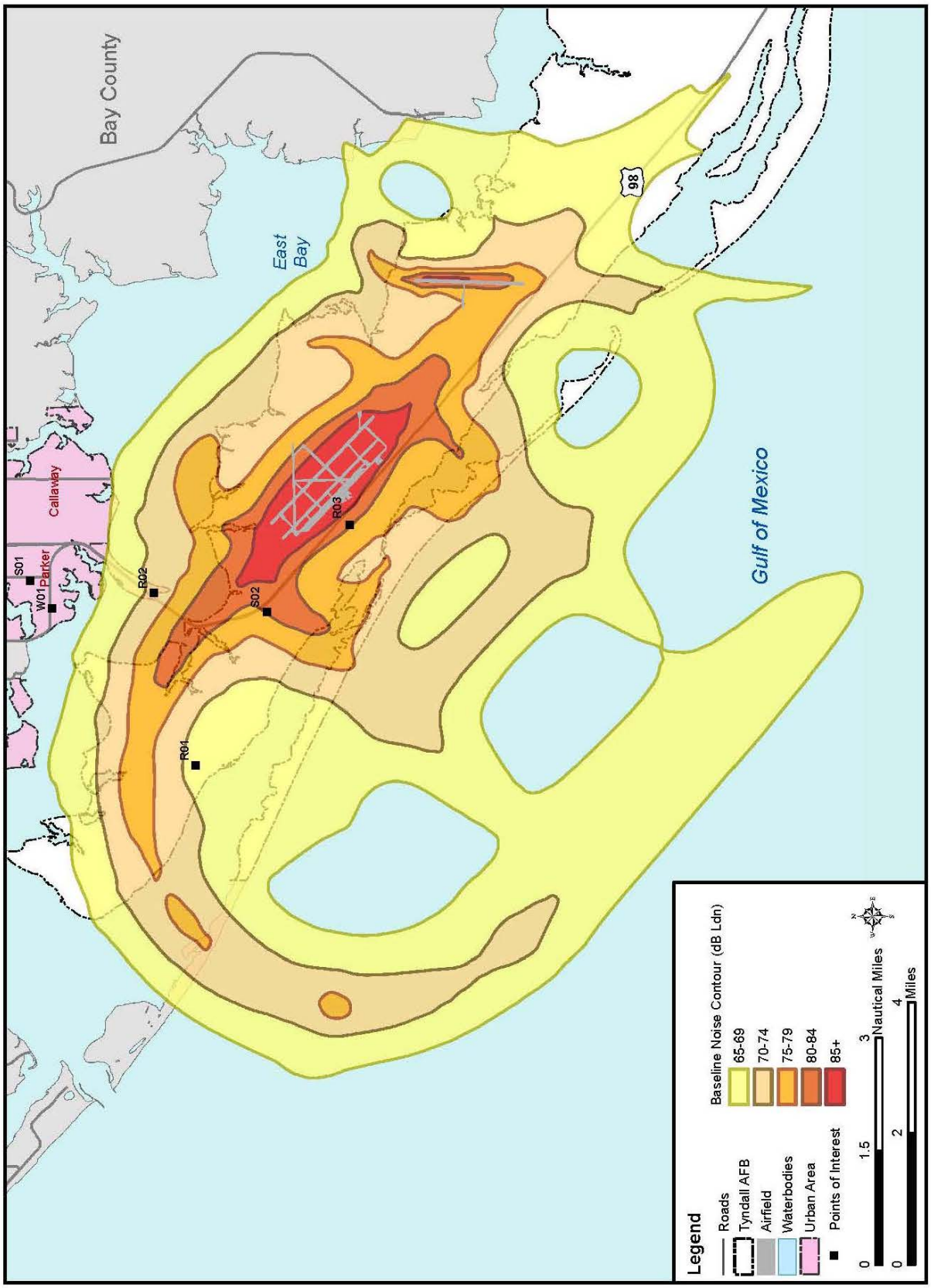

Figure 3–1. Baseline Noise Contours

Table 3–4. Baseline Noise Levels at Representative Noise-Sensitive Locations

Location ID	Location Description	L_{dn}	Potential Speech Interference Events Per Day		Probability of Awakening	
			(windows open)	(windows closed)	(windows open)	(windows closed)
R01	Wood Manor (on-base accompanied housing area)	68	9	5	11%	6%
R02	City of Parker	72	17	11	17%	10%
R03	Tyndall AFB Dorms	80	19	16	30%	18%
S01	Parker Elementary School	57	11	2	N/A	N/A
S02	Tyndall Elementary School	80	20	18	N/A	N/A
W01	First Baptist Church of Parker	60	10	4	N/A	N/A

Speech interference is a common cause of noise-related annoyance. Speech interference is difficult to predict accurately since people often increase speaking volume as background noise increases, thereby allowing communication to continue. Research has shown that, for speakers talking with a casual vocal effort, 95 percent intelligibility would be achieved when indoor L_{max} values did not exceed 50 dB. In warm climates, typical residential structures provide 24 dB outdoor-to-indoor Noise Level Reduction (NLR) with windows closed and 12 dB with windows open. Other types of structures, such as schools and churches, are assumed to provide the same NLR as residences for the purposes of this analysis.

Table 3–4 presents the estimated average number of overflight events per day with potential to interfere with indoor speech if windows are open and if windows are closed. Estimates of speech interference events at schools are based on the frequency of aircraft operations during the school day (7:00 AM to 3:00 PM) and speech interference at non-school locations is based on frequency of operations during times when most people are awake (7:00 AM to 10:00 PM). The average number of aircraft overflight events per hour with potential to interrupt speech indoors ranges from 9 to 20 with windows open and from 2 to 18 with windows closed.

Sleep disturbance is another indicator of noise conditions. Table 3–4 presents the probability of a person being woken by aircraft noise at least once per night on average with windows open and windows closed. Probabilities were calculated based on the methodology described in American National Standards Institute (ANSI) 12.9-2008, which was designed based on the results of several field studies. The probability of sleep disturbance is not listed for schools and places of worship. The percentage that persons awakened at least once per night by aircraft noise ranges from 11 percent to 30 percent with windows open and from 6 percent to 18 percent with windows closed.

According to a recent Undersecretary of Defense memorandum, populations exposed to noise levels equal to or exceeding 80 L_{dn} are at the greatest risk of Potential Hearing Loss (PHL) (UDATL 2009). Under baseline conditions, the 80 L_{dn} contour does not extend to any off-base land areas, but does include areas near the Tyndall AFB flightline and along the extended runway centerline. There are 349 structures affected by noise levels at or exceeding 80 $L_{dn.}$

Persons working in known high-noise areas on DoD installations are protected from PHL risk by a Hearing Conservation Program. The Hearing Conservation Program at Tyndall AFB is conducted in accordance with Air Force Occupational Safety and Health (AFOSH) Standard 48-20, DoD Instruction 6055.12, and 29 Code of Federal Register 1910.95. The DoD, Air Force, and the National Institute of Occupational Safety and Health (NIOSH) have all established criteria for occupational noise exposure damage risk (or "standard") for hearing loss to not exceed 85

dB as an 8-hour time weighted average, with a 3 dB exchange rate in a work environment. The exchange rate is an increment of decibels that requires the halving of exposure time or a decrement of decibels that requires the doubling of exposure time. For example, a 3 dB exchange rate requires that noise exposure time be halved for each 3 dB increase in noise level. Therefore, an individual would achieve the limit for risk criteria at 88 dB for a period of four hours, and at 91 dB, for a period of two hours. The standard assumes "quiet" (where an individual remains in an environment with noise levels less than 72 dB) for the balance of the 24-hour period. Also, Air Force and Occupational Safety and Health Administration (OSHA) occupational standards prohibit any unprotected worker exposure to continuous (i.e., of a duration greater than one second) noise exceeding a 115 dB sound level. OSHA established this additional standard to reduce the risk of workers developing noise-induced hearing loss.

The Hearing Conservation Program at Tyndall AFB is administered by the Bioenvironmental Engineering Office. As per AFOSH Standard 48-20, representatives from the Bioenvironmental Engineering Office visit facilities in which workers could potentially be exposed to noise levels exceeding regulatory thresholds. A health risk assessment is conducted and, as part of the assessment, a representative sample of employees is instructed to carry noise dosimeters for a specified period. If noise exposure exceeds established thresholds, an audiometric monitoring program is initiated. Workers in known high noise exposure locations may be required to wear hearing protection devices including but not limited to earplugs and earmuffs. If noise exposure thresholds are not exceeded, a schedule is established for return visits to the facility to repeat testing to confirm that conditions have not changed. Persons working the Tyndall AFB flightline area are subject to occupational noise exposure laws and regulations. The Tyndall AFB Bioenvironmental Engineering Office considers several factors including structural noise attenuation and the amount of time workers spend outside when deciding on the appropriate course of action for implementation of the Hearing Conservation Program.

Of the 349 structures affected by noise levels at or greater than 80 L_{dn}, 59 are residential. Fifty-seven of the residential structures are freestanding houses and the other two residential structures are dorms for unaccompanied airmen. Dorm occupants typically reside in the dorms for approximately two years before being transferred to another installation. The dorms are also constructed of heavy materials (i.e., brick and mortar) which typically provide greater outdoor-to-indoor noise attenuation than less solidly built structures. As the potential for hearing loss risk is assessed under a scenario in which the listener is exposed to the full noise level (no structural attenuation) for a period of 40 years, actual hearing loss risk for dorm residents under baseline conditions is expected to be low.

Tyndall Elementary School is exposed to 80 L_{dn} under baseline conditions. In accordance with Air Force policy, this noise level could potentially be associated with hearing loss if persons were exposed (with no structural sound attenuation) over a long period. At an elementary school, students are exposed for approximately six years (Kindergarten through 5th grade) but teachers and staff are exposed for a longer period. Outdoor-to-indoor noise attenuation provided by the school building reduces noise levels for persons indoors, but not for children playing outside the school and teachers and other staff monitoring the children while they play. Since both teachers and students spend the majority of the school day indoors, actual exposure is less than 80 L_{dn}, and aircraft noise induced hearing loss risk is considered minimal.

Non-aircraft noise sources on and near Tyndall AFB include vehicle traffic and machinery (e.g., air conditioning units). For example, motor boats and jet skis operating in the waters surrounding Tyndall AFB generate noise intermittently and Tyndall AFB occasionally carries out construction, demolition, and renovation projects to better support the evolving mission. Construction that occurs off the installation is also a frequent occurrence. When manmade sounds are not audible, the sound environment is dominated by natural sounds such as wind, waves, and birdcalls.

Airspace - Training flights are dispersed and distributed throughout the training airspace unit within MOAs, warning areas, and overlying ATCAAs. Baseline aircraft noise levels in primary use MOAs and overlying ATCAAs are listed in Table 3–5. Noise levels were calculated based on FY08 sortie operations counts with adjustment to account for F-35 sortie operations as described in the ROD and Final EIS for the Implementation of Base Realignment and Closure (BRAC) 2005 Decisions for JSF ITC, Eglin AFB (Air Force 2009). For the purposes of noise analysis, sortie operations that take place in Compass Lake and Carrabelle Work Areas were treated as occurring within the charted Tyndall MOAs that make up the work areas. Subsonic noise levels in all airspace units are 62 L_{dnmr} or less in all airspace units except Tyndall G MOA, where the noise level is 67 L_{dnmr}. Tyndall G MOA is located almost entirely over water, and noise generated in this area affects a limited number of persons.

Table 3–5. Baseline Noise Levels Beneath Military Operations Areas (MOAs)

Airspace Unit *	Monthly Day-Night Average Sound Level (L_{dnmr}) in Decibels (dB)
Tyndall B MOA	62
Tyndall C/H MOA	58
Tyndall D MOA	58
Tyndall E MOA	58
Tyndall F MOA	44
Tyndall G MOA	67

Note: Air Traffic Controlled Assigned Airspace (ATCAA) supersonic approved above 30,000 MSL; sonic booms would not be expected to propagate to the ground.

Time-averaged cumulative noise metrics such as L_{dnmr} represent the most widely accepted method of quantifying noise impact. They do not provide an intuitive description of the noise environment and people often desire to know what the loudness of an individual aircraft would be. Table 3–6 lists SEL at various distances and altitudes for several aircraft types.

Table 3–6. Sound Exposure Level (SEL) under the Aircraft Flight Track at Various Altitudes in the Primary Airspace [1]

Aircraft Type	Airspeed	Power Setting	500 AGL	1,000 AGL	2,000 AGL	5,000 AGL	10,000 AGL	30,000 AGL
F-15C	520	81 %NC	112	107	101	91	80	53
F-22	450	70% ETR	116	111	105	95	86	68
F-16 [2]	450	87% NC	107	101	95	85	74	66
F-18C/D	500	92 %NC	114	108	101	89	77	51
T-38	450	100 % RPM	109	104	97	86	76	56

Note:
[1] Level flight with steady high-speed conditions.
[2] Equipped with Pratt and Whitney 229 engine

Key:
AGL = Above Ground Level
ETR = Engine Thrust Request
RPM = revolutions per minute
NC = Number of engine Core revolutions
SEL= Sound Level Exposure

Supersonic flight for fighter aircraft is primarily associated with air combat training, is authorized in the warning areas at all altitudes, and produces an air pressure wave that may reach the ground as a sonic boom. The amplitude of an individual sonic boom is measured by its peak overpressure in pounds per square foot (psf), which depends on an aircraft's size, weight, geometry, Mach number, and flight altitude. Table 3–7 shows sonic boom overpressures for the F-15 and F-22 aircraft in level flight at various conditions. Altitude is the biggest single condition affecting overpressure. Maneuvers can also affect boom peak overpressures, increasing or decreasing them from those shown in Table 3–7 and Appendix B.

Table 3–7. Sonic Boom Peak Overpressures for F-15 and F-22 Aircraft at Mach 1.2 Level Flight

Aircraft	Altitude in feet at Mean Sea Level (MSL) in pounds per square foot (psf)		
	10,000	20,000	30,000
F-22	6.2	3.2	2.1
F-16C	4.9	2.5	1.6
F-15E	6.4	3.3	2.2

Notes:
1. Calculated using the CABOOM program
2. Focusing can result in overpressures increased by 2 to 5 times the steady state boom levels.
3. Boom levels diminish toward 0.1 pound per square foot (psf) as the lateral distance increases.

Aircraft exceeding Mach 1 always create a sonic boom, although not all supersonic flight activities would cause a boom at the ground. As altitude increases, air temperature decreases, and the resulting layers of temperature change cause booms to be turned upward as they travel toward the ground. Depending on the altitude of the aircraft and the Mach number, many sonic booms are bent upward sufficiently that they never reach the ground. This same phenomenon, referred to as "cutoff", also acts to limit the width (area covered) of the sonic booms that reach the ground (Plotkin *et al.* 1989).

When a sonic boom reaches the ground, it affects an area which is referred to as a "footprint" or (for sustained supersonic flight) a "carpet". The size of the footprint depends on the supersonic flight path and on atmospheric conditions. Sonic booms are loudest near the center of the footprint, with a sharp "bang-bang" sound. Near the edges, they are weak and have a rumbling sound like distant thunder.

Sonic booms from air combat training activity tend to be concentrated within elliptical boundaries fitting within the warning areas. Aircraft would set up at positions up to 100 nm apart before proceeding toward each other for an engagement. The airspace used tends to be aligned, connecting the setup points in an elliptical shape. Aircraft would fly supersonic at various times during an engagement exercise. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement. The long-term average sonic boom patterns also tend to be elliptical and this is reflected by the spatial distribution of L_{cdn} noise levels.

Long-term sonic boom measurement projects have been conducted in White Sands, New Mexico (Plotkin *et al.* 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin *et al.* 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton *et al.* 1993); and the western portion of the Goldwater Range (Page *et al.* 1994). These studies included analysis of schedule and ACMI data and supported development of the 1992 BOOMAP model (Plotkin *et al.* 1992). The current

version of BOOMAP (Frampton *et al.* 1993; Plotkin 1996) incorporates results from all four studies. Since BOOMAP is directly based on long-term measurements, it implicitly accounts for maneuvers, statistical variations in operations, atmospheric effects, and other factors. Table 3–8 shows baseline supersonic noise levels (L_{cdn}) and the average number of sonic booms per day at the center of the offshore warning areas proposed for use. Supersonic noise levels and the number of booms per day are lower in areas not at the center of the airspace. .

Table 3–8. Baseline Noise Levels Beneath Offshore Warning Areas

Airspace Unit	L_{cdn} (decibels)	Average Number of Booms Per Day [2]
W-151A/B/C/D [1]	51	0.7
W-470 A/B/C/D/E/F [1]	56	2.1

Notes:
[1] Supersonic approved above 10,000 MSL.
[2] Near the center of the airspace units

3.3 Safety

3.3.1 Resource Definition and Applicable Laws

3.3.1.1 Ground Safety

Ground safety includes many categories such as ground and industrial operations, operational and OSHA, motor vehicles use, off-duty military and maritime activities, and fire (AFI 91-202). Ground mishaps can occur on the ground or in the water (on or off an installation) and may involve Air Force personnel, contractors, and property losses. They can occur in a work environment from the use of equipment or materials including administrative, supply, custodial, and maintenance for Air Force functions. Day-to-day construction operations under each alternative must be performed in accordance with all applicable Air Force safety regulations, published Air Force Technical Orders, and AFOSH requirements. Construction and demolition activities that occur on base are required to have an appropriate safety plan for the job site that explains how tasks would be accomplished while assuring job safety throughout the life of the project. Construction and demolition workers are also required to follow applicable OSHA requirements. Occupational health and safety would be governed by the terms of the contract, which may incorporate Air Force regulations and technical orders, AFOSH standards, and OSHA standards.

Anti-Terrorism/Force Protection (AT/FP) is a security program designed to protect Air Force active duty personnel, civilian employees, family members, facilities, and equipment in all locations and situations. The program is accomplished through the planned and integrated application of anti-terrorism measures, physical security, operations security, and personal protective services. It is supported by intelligence, counterintelligence, and other security programs. In response to terrorist attacks, several regulations have been promulgated to ensure that force protection standards are incorporated into the planning, programming, and budgeting for the design and construction of Military Construction (MILCON)-funded facilities. UFC 04-010-01, *DoD Minimum Antiterrorism Standards for Buildings* (published in 2003 and updated in 2007) establishes minimum standoff distances that must be maintained between several categories of structures and areas that are relatively accessible to terrorists.

3.3.1.2 Airfield Safety

Accident Potential Zones (APZ) - Accident potential relies on identifying where most accidents occurred in the past at military airfields (Air Force 1972; AFH 32-7084). This approach does not produce accident probability statistics since the question of probability involves too many variables for an accurate prediction model to be developed. Rather, the analysis of military aircraft accident history focuses on determining where, within the airfield environment, an accident is likely to occur and how large the impact area results from any single accident. The Clear Zone (CZ), APZ I, and APZ II were established based on crash patterns. The CZ starts at the end of the runway and extends outward 3,000 feet. It has the highest accident potential of the three zones. The Air Force adopted a policy of acquiring property rights to areas designated as CZs due to the high accident potential in those areas. APZ I extends from the CZ an additional 5,000 feet as an area of reduced accident potential. APZ II extends from APZ I an additional 7,000 feet encompassing an area of further reduced accident potential.

As per DoD Instruction 4165.57, *Air Installations Compatible Use Zones*, Tyndall AFB has established the following APZs for Runways 13L/31R, 13R/31L, and 18/36 to ensure compatible land use and safety in and around the airfield environment (DODI 4165.57). At each end of each runway, a 3,000-foot by 3,000 foot CZ, a 3,000-foot by 5,000 foot APZ I, and a 3,000-foot by 7,000 foot APZ II have been created (Figure 3–2). Additionally, in accordance with UFC 3-260-01, imaginary surfaces are established in the runway environment. As required, the area surrounding a runway, which must be kept clear of objects that might damage an aircraft, is bounded by imaginary surfaces that are defined by the UFC. Objects (whether manmade or natural) that project above an imaginary surface are considered an obstruction. Airfield waivers may be established for those objects that cannot be reasonably relocated or removed.

Ground Obstructions - All structures on the ground have the potential to create hazards to flight. The FAA provides detailed instructions for the marking of obstructions (i.e., paint schemes and lighting) to warn pilots of their presence. Any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet (61 meters) AGL or exceeds any obstruction standard contained in 14 CFR Part 77, should normally be marked and/or lighted. The FAA may also recommend marking and/or lighting a structure that does not exceed 200 feet AGL or 14 CFR Part 77 standards because of its particular location (FAA 2007). The obstruction standards in 14 CFR Part 77 are primarily focused on structures in the immediate vicinity of airports and approach and departure corridors from airports.

3.3.1.3 Explosive Safety

Defense Department Explosives Safety Board (DDESB) 6055.9-Standard and Air Force Manual (AFM) 91-201, *Explosives Safety Standards*, represents DoD and Air Force guidelines for complying with explosives safety (AFM 91-201). These regulations, as well as AFI 91-204, identify explosives safety mishaps involving both explosive and chemical agents. Explosives include ammunition, propellants (solid and liquid), pyrotechnics, warheads, explosive devices, and chemical agent substances and associated components that present real or potential hazards to life, property, or the environment.

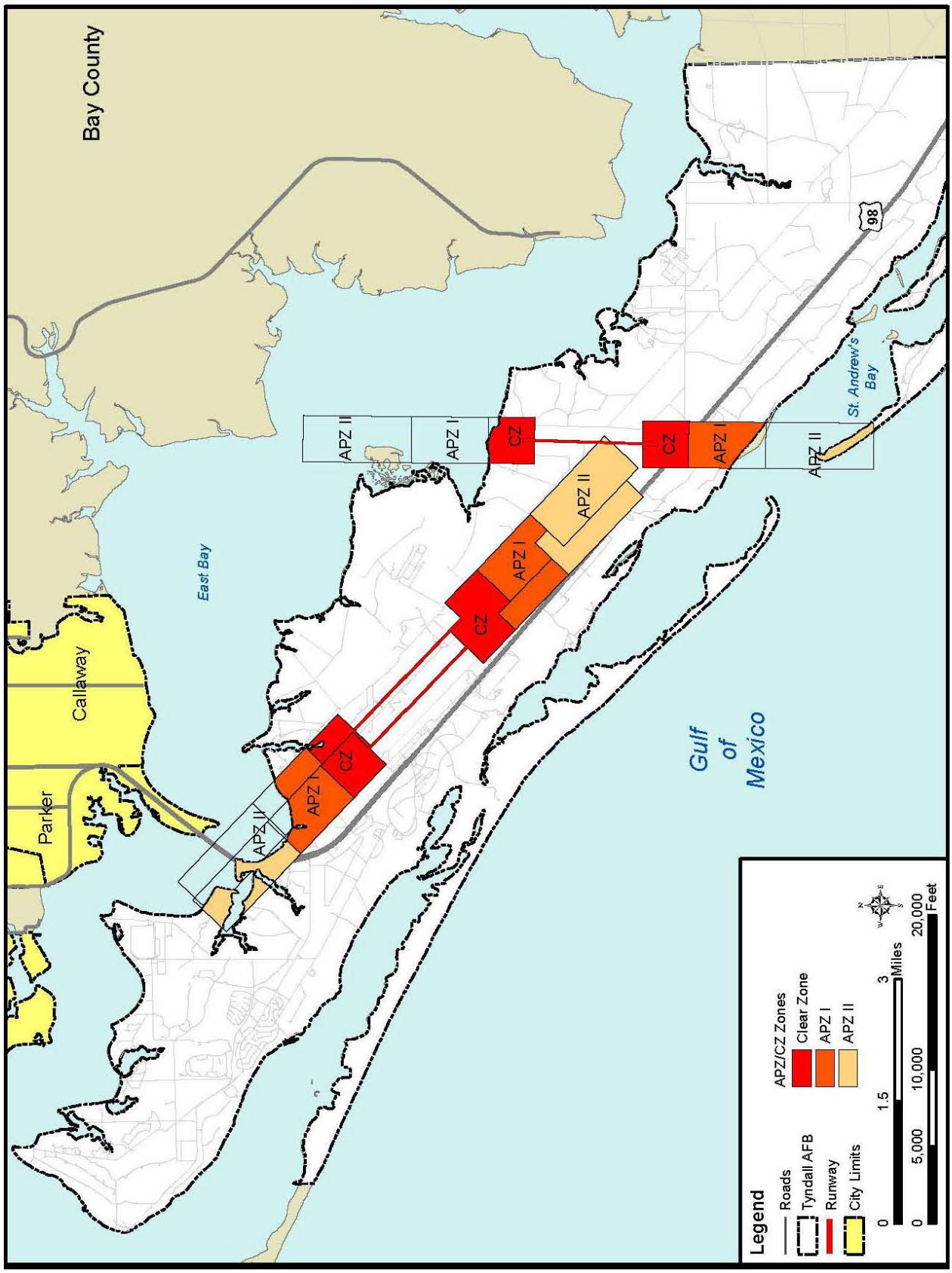

Figure 3–2. Tyndall AFB Clear Zones and Accident Potential Zones

3.3.1.4 Flight Safety

Aircraft Mishaps - The primary public concern with regard to flight safety is the potential for aircraft accidents. Such mishaps may occur due to weather-related accidents, mechanical failure, pilot error, mid-air collisions, collisions with manmade structures or terrain, or bird-aircraft collisions. Flight risks apply to all aircraft; they are not limited to the military.

The Air Force defines four major categories of aircraft mishaps: Classes A, B, C, and E (also classified as High Accident Potential [HAP]). Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $2 million, or destruction of an aircraft. Class B mishaps result in a total cost of more than $500,000 (but less than $2 million) and result in permanent partial disability or inpatient hospitalization of three or more personnel. Class C mishaps involve reportable damage of more than $50,000 (but less than $500,000), an injury resulting in any loss of time from work beyond the day or shift on which it occurred, or occupational illness that causes loss of time from work at any time; or an occupational injury or illness resulting in permanent change of job. HAP events are any hazardous occurrence that has a high potential for becoming a mishap. They are significant aircraft, missile, space, explosives, miscellaneous air operations, or ground occurrences with a high potential for causing injury, occupational illness, or damage if they recur. These events do not have reportable mishap costs. Class E/HAP events are events deemed important enough to trend for mishap prevention despite the fact they do not meet other mishap class reporting criteria. Class C mishaps and E/HAP, the most common types of accidents, represent relatively unimportant incidents since they generally involve minor damage and injuries, and rarely affect property or the public. This EA focuses on Class A mishaps because of their potentially catastrophic results.

Bird/Wildlife-Aircraft Strike Hazard (BASH) - Tyndall AFB and Vicinity. BASH constitutes a safety concern for the Air Force since they can result in damage to aircraft or injury to aircrews or local human populations if an aircraft crashes. Aircraft may encounter birds at altitudes up to 30,000 feet MSL or higher; however, most birds fly close to the ground. More than 97 percent of reported bird strikes occur below 3,000 feet AGL, about 30 percent happen in the airport environment, and almost 55 percent occur during low-altitude flight training (AFSC 2011a).

3.3.2 Affected Environment

3.3.2.1 Ground Safety

Capability for fire response is located both on base and within the impacted communities. The on-base fire department is party to mutual aid support agreements with the nearby community. The 325 FW maintains detailed emergency and mishap response plans to react to accidents or emergencies, should one occur that assign agency responsibilities and prescribe functional activities necessary to react to mishaps, whether they occur on, or off base.

Siting and design guidance intent is to improve security, minimize fatalities, and limit damage to facilities in the event of a terrorist attack. Many military installations, such as Tyndall AFB, were developed before AT/FP considerations became a critical concern. Thus, under current conditions, many installations are not able to comply with all present AT/FP standards. As new construction occurs, the base would incorporate these standards and, as facilities are modified, AT/FP standards would be incorporated to the maximum extent practicable.

3.3.2.2 Airfield Safety

Accident Potential Zones (APZs) - CZs and APZs are established around the airfield. Data on mishaps within ten nm of an airfield reveals that 75 percent of aircraft accidents occur on, or adjacent to, the runway and in a corridor extending out from the end of a runway for 15,000 feet. Three zones (CZ, APZ I, and APZ II) within this corridor have been established based on aircraft mishap patterns. Within the CZ, (covers a 3,000-by 3,000-foot area at the end of each runway), the overall accident risk is highest. APZ I extends for 5,000 feet beyond the CZ is an area of reduced accident potential. In APZ II is 7,000 feet long where accident potential is the lowest among the three zones. At Tyndall AFB, the Air Force has acquired most of the property within the CZ and the APZs. Since all zones associated with Tyndall AFB are either on base or over open water, no development that would be considered incompatible exists outside Air Force-owned property.

Ground Obstructions - Tyndall AFB currently has 22 airfield waivers and three exceptions in effect for airfield requirements contained in UFC 3-260-1 (Hester 2011). They range from a guard shack located approximately 800 feet from the centerline of runway 13L/31R to exceedances of parking apron grades on Charlie Row. While some are impractical to address (such as proximity to existing hangars or mission requirements), many are programmed to be relocated or removed as funding becomes available.

3.3.2.3 Explosive Safety

Tyndall AFB stores, maintains, and uses a range of munitions required to perform their missions. All ordnance is handled and stored in accordance with Air Force explosive safety directives (AFM 91-201) and DDESB 6055.9. All munitions maintenance is carried out by trained, qualified personnel using Air Force-approved technical procedures. Restrictions apply to areas immediately surrounding munitions storage facilities to provide separation between facilities and other activities for safety purposes. Similar restrictions also apply in areas near stationary aircraft that carry munitions. These areas, defined by Q-D arcs, vary in size depending on the type and quantity of munitions stored. Setback distances define how close adjacent facilities can be located and inhabited. The 325 FW has no explosives/munitions related Waivers, Deviations, or Exemptions from DDESB 6055.9-Standard, AFM 91-201 *Explosives Safety Standards*, or command supplements.

3.3.2.4 Flight Safety

Aircraft Mishaps - Based on historical data on mishaps at all installations and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. Mishap rates do not consider combat losses due to enemy action. In evaluating this information, it should be emphasized that data presented are only statistically predictive. The actual causes of mishaps are due to many factors, not simply the aircraft's amount of time flying. Mishap rates are statistically assessed as an occurrence rate per 100,000 flying hours. Table 3–9 reflects the cumulative annual Class A mishap rates of the F-15, F-22, and T-38 for the periods for which accident records have been established. F-15 aircraft were included since they were previously based at Tyndall AFB. In Calendar Year (CY) 2010, the threshold for determining Class A and B mishaps was raised from 1 million to 2 million dollars for Class A and the ceiling was raised for Class B to 1 million dollars.

Table 3–9. Class A Accident History

Aircraft	Reporting Period	Accident Rate per 100,000 hours	Lifetime Hours Flown
F-22	Fiscal Year (FY) 02-FY10	6.35	94,519
F-15	Calendar Year (CY) 72-FY10	2.39	5,907,739
T-38	CY60-FY10	1.47	13,734,629

Source: AFSC 2011b

Historically, when a new military aircraft first enters inventory, its flight safety accident rate is higher. The F-22 is a relatively new aircraft in contrast to the F-15. As such, the F-22 has not yet achieved a similar level of flight hours as the F-15. The F-22 began flying eight years ago, in FY02. It had accumulated 94,519 flight hours by the end of FY10. By contrast, the F-15 began flying over 38 years ago (in Calendar Year [CY] 72) and accumulated 5,907,793 flight hours by the end of FY10. Based upon the expected flight hours for the F-22, it is expected that the F-22 would eventually have an accident rate of two to three per 100,000 flight hours. This estimation is based on an established trend regarding military aircraft.

Combat aircraft are becoming more reliable and easier to maintain, even as they become more complex. In the early 1950s, the F-89 fighter had 383 accidents per 100,000 flying hours. A decade later, the accident rate was in the 20s for a new generation of aircraft. At that time, the F-4, which served into the 1990s, had a rate of fewer than five accidents per 100,000 hours. As the F-22 aircraft, the pilots who fly it, and the technicians who maintain it, gain more experience, mishap rates would be reduced and a relatively constant level of accidents would be maintained. The F-22 Class A mishap rate is expected to approach that of the F-15 over time.

BASH - Tyndall AFB and Vicinity - A bird/wildlife aircraft strike hazard exists at Tyndall AFB and its vicinity due to resident and migratory bird species and other wildlife. Daily and seasonal bird movements create various hazardous conditions. To address the issues of aircraft bird strikes, the Air Force has developed the Avian Hazard Advisory System (AHAS) to monitor bird activity and forecast bird strike risks. Using Next Generation Radar (NEXRAD) weather radars and models developed to predict bird movement, the AHAS is an online, near real-time, Geographic Information System (GIS) used for flight planning from bird strike risk across the Continental United States (CONUS) and Alaska. Additionally, as part of an overall strategy to reduce BASH risks, the Air Force has developed a Bird Avoidance Model (BAM) using GIS technology as a key tool for analysis and correlation of bird habitat, migration, and breeding characteristics and is combined with key environmental and man-made geospatial data. The model was created to provide Air Force pilots and flight schedulers/planners with a tool for making informed decisions when selecting flight routes. The model was created to protect human lives, wildlife, and equipment during air operations. This information is integrated into required pilot briefings that take place prior to any sortie. Tyndall AFB is located in a bird migratory corridor (flyaway) so the BASH Plan establishes procedures to minimize this hazard including the removal or control of bird attractants. For the period FY08 to FY10, Tyndall AFB personnel recorded 65 bird strikes with 35 percent of them being Mourning Doves. No strikes resulted in a Class A accident.

3.4 Air Quality

3.4.1 Resource Definition and Applicable Laws

Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The significance of a pollutant concentration in a region or geographical area is determined by comparing it to federal and/or state ambient air quality standards. Under the authority of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (USEPA) has established nationwide air quality standards to protect public health and welfare with an adequate margin of safety. These federal standards (NAAQS) represent the maximum allowable atmospheric concentrations of pollutants. They were developed for seven "criteria" pollutants: Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), Particulate Matter less than 10 Micrometers (PM_{10}), Particulate Matter less than 2.5 Micrometers ($PM_{2.5}$), Ozone (O_3), and Lead (Pb). The NAAQS are defined in terms of concentration (e.g., parts per million [ppm] or micrograms per cubic meter [$\mu g/m^3$]) determined over various periods of time (averaging periods). Short-term standards (one-hour, eight-hour, or 24-hour periods) were established for pollutants with acute health effects and generally may not be exceeded more than once per year. Long-term standards (annual periods) were established for pollutants with chronic health effects and may never be exceeded.

Based on measured ambient criteria pollutant data, USEPA designates areas of the U.S. as having air quality that is equal to or better than the NAAQS (attainment) or worse than the NAAQS (nonattainment). Upon achieving attainment, areas previously in nonattainment are considered to be in maintenance status for a period of ten or more years. Areas are designated as unclassifiable for a pollutant when there is insufficient ambient air quality data for the USEPA to form a basis of attainment status. Application of air quality regulations for unclassifiable areas is treated similar to areas that are in attainment of the NAAQS (Table 3–10). Florida has adopted the NAAQS, except for the new SO_2 one-hour standard.

Table 3–10. National and Florida Ambient Air Quality Standards

Criteria Pollutant	Averaging Time	Federal Primary NAAQS	Federal Secondary NAAQS	Florida Standards
Carbon Monoxide (CO) [1]	8-hour	9 ppm	No standard	9 ppm
		(10 mg/m^3)		(10 $\mu g/m^3$)
	1-hour	35 ppm	No standard	35 ppm
		(40 mg/m^3)		(40 $\mu g/m^3$)
Lead (Pb) [2]	Rolling 3-month average	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$
Nitrogen Dioxide (NO_2) [3]	Annual	0.053 ppm	0.053 ppm	0.053 ppm
		(100 $\mu g/m^3$)	(100 $\mu g/m^3$)	(100 $\mu g/m^3$)
	1-hour	100 ppb	No standard [9]	100 ppb
Particulate Matter less than 10 microns in diameter (PM_{10}) [4]	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
Particulate Matter less than 2.5 microns in diameter ($PM_{2.5}$) [5]	Annual	15 $\mu g/m^3$	15 $\mu g/m^3$	15 $\mu g/m^3$
	24-hour	35 $\mu g/m^3$	35 $\mu g/m^3$	65 $\mu g/m^3$
Ozone (O_3) [6]	8-hour	0.08 ppm	0.08 ppm	
		(157 $\mu g/m^3$)	(157 $\mu g/m^3$)	

Criteria Pollutant	Averaging Time	Federal Primary NAAQS	Federal Secondary NAAQS	Florida Standards
Sulfur Dioxide (SO_2) [7]	Annual	0.03 ppm	No standard	0.02 ppm
		(80 µg/m^3)		(60 µg/m^3)
	24-hour	0.14 ppm	No standard	0.10 ppm
		(365 µg/m^3)		(260 µg/m^3)
	3-hour	No standard	0.50 ppm [8]	0.50 ppm
			(1300 µg/m^3)	(1300 µg/m^3)
	1-hour	75 ppb	No standard	No Standard

Notes:

[1] The United States Environmental Protection Agency (USEPA) plans to promulgate a new CO standard in August 2011. The current 8-hour and 1-hour averages are not to be exceeded more than once per year.

[2] The new Pb standard was promulgated October 2008. The rolling three-month average is not to be exceeded.

[3] The new NO_2 standard was promulgated in January 2010. The official level of the standard is 0.053 ppm, equal to 53 parts per billion (ppb), which is shown here for the purpose of clearer comparison to the 1-hour standard. The annual average is not to be exceeded. To attain the 1-hr standard, the three-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb.

[4] The PM_{10} standard is not to be exceeded more than once per year on average over three years.

[5] The $PM_{2.5}$ standard was promulgated in September 200, and a new standard is expected to be promulgated in October 2011. Until then, to attain the annual standard, the three-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 ug/m³. To attain the 24-hour standard, the three-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 ug/m³.

[6] USEPA plans to promulgate a new O_3 standard July 2011. Until then, to attain the 8-hour standard, the three-year average of the fourth highest daily maximum 8-hour average ozone concentration measured at each monitor within an area over each year must not exceed 0.075 ppm. USEPA is also considering a secondary standard for O_3.

[7] The new SO_2 standard was promulgated June 2010. USEPA plans to revoke the annual and 24-hour maximums one year after designations for the 1-hour standard occur. Until then, the annual standard is not to be exceeded and the 24-hour maximum is not to be exceeded more than once per year. To attain the 1-hour maximum, the three-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb. The secondary standard may not be exceeded more than once per year and remains in place until a new secondary standard is established.

[8] USEPA is reviewing the possibility of establishing a multi-pollutant secondary standard for NO_x and SO_x together, which would be promulgated by March 2010. Until then, the existing secondary standards for NO_2 and SO_2 would remain in place.

Key:

ppm = parts per million — mg/m³ = milligrams per cubic meter
ppb = parts per billion — µg/m³ = micrograms per cubic meter

Source: USEPA 2010 (National Standards); FDEP 2010 (Florida Standards).

State Implementation Plan (SIP) - SIP is a detailed description of the programs that a state uses to carry out its responsibilities under the CAA. They are a collection of regulations used by a state to reduce air pollution and the CAA requires that USEPA approve each SIP. For attainment, non-attainment, and unclassifiable region all states are required to develop a SIP designed to eliminate or reduce the severity and number of NAAQS violations. The underlying goal is to bring state air quality conditions into (and maintain) compliance with the NAAQS by specific deadlines. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS in each state.

Prevention of Significant Deterioration (PSD) - Section 162 of the CAA further established the goal of the PSD for air quality in all international parks, national parks that exceeded 6,000 acres, and national wilderness areas and memorial parks that exceeded 5,000 acres if these areas were in existence on 7 August 1977. These areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. Under CAA Section 164, states or tribal nations, in addition to the federal government, have the authority to redesignate certain areas as (non-mandatory) PSD Class I areas (e.g., a national park or national wilderness area established after 7 August 1977, which exceeds 10,000 acres). PSD Class I areas are areas where any appreciable deterioration of air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted. Class III areas are those designated by the governor of a state as requiring less protection than Class II areas. No

Class III areas have yet been so designated. The PSD requirements affect construction of new major stationary sources in areas that attain the NAAQS and serve as a pre-construction permitting system. In attainment and unclassifiable areas, the federal New Source Review (NSR) program is implemented under the PSD preconstruction program requirements of Section 165 of the CAA and the implementing regulations in 40 CFR § 52.21. Florida's PSD program regulations are included in Florida Administrative Code (FAC) 62-212.400.

There are three designated PSD Class I areas in Florida: Chassahowitzka National Wildlife Refuge (NWR) Wilderness Area, Everglades National Park, and St. Marks Wilderness Area. All are more than 50 miles from the proposed construction areas (FAC 62-204-240).

Greenhouse Gases (GHGs) – Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions are generated by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. The U.S. Global Change Research Program report *Global Climate Change Impacts in the United States* states:

> "Observations show that warming of the climate is unequivocal. The global warming observed over the past 50 years is due primarily to human-induced emissions of heat-trapping gases. These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from the clearing of forests, agricultural practices, and other activities.
>
> Warming over this century is projected to be considerably greater than over the last century. The global average temperature since 1900 has risen by about 1.5 degrees Fahrenheit (^{o}F). By 2100, it is projected to rise another 2 to 11.5^{o}F. The U.S. average temperature has risen by a comparable amount and is very likely to rise more than the global average over this century, with some variation from place to place. Several factors will determine future temperature increases. Increases at the lower end of this range are more likely if global heat-trapping gas emissions are cut substantially. If emissions continue to rise at or near current rates, temperature increases are more likely to be near the upper end of the range. Volcanic eruptions or other natural variations could temporarily counteract some of the human-induced warming, slowing the rise in global temperature, but these effects would only last a few years.
>
> Reducing emissions of carbon dioxide would lessen warming over this century and beyond. Sizable early cuts in emissions would significantly reduce the pace and the overall amount of climate change. Earlier cuts in emissions would have a greater effect in reducing climate change than comparable reductions made later. In addition, reducing emissions of some shorter-lived heat-trapping gases, such as methane, and some types of particles, such as soot, would begin to reduce warming within weeks to decades.
>
> Climate-related changes have already been observed globally and in the United States. These include increases in air and water temperatures, reduced frost days, increased frequency and intensity of heavy downpours, a rise in sea level, and reduced snow cover, glaciers, permafrost, and sea ice. A longer ice-free period on lakes and rivers, lengthening of the growing season, and increased water vapor in the atmosphere have also been observed. Over the past 30 years, temperatures have risen faster in winter

> than in any other season, with average winter temperatures in the Midwest and northern Great Plains increasing more than 7°F. Some of the changes have been faster than previous assessments had suggested.
>
> These climate-related changes are expected to continue while new ones develop. Likely future changes for the United States and surrounding coastal waters include more intense hurricanes with related increases in wind, rain, and storm surges (but not necessarily an increase in the number of these storms that make landfall), as well as drier conditions in the Southwest and Caribbean. These changes will affect human health, water supply, agriculture, coastal areas, and many other aspects of society and the natural environment" (Karl *et al*., 2009).

While regional and state impacts are more difficult to predict than large regional or global impacts, a report by the Florida Governor's Action Team on Energy and Climate Change (2010) says that regional models indicate the following possible impacts in the state of Florida:

- Sea level rise could lead to flooding of low-lying areas, erosion of beaches, loss of coastal wetlands, intrusion of salt water into water supplies, and increased vulnerability of coastal areas to storms and hurricanes.
- As climate changes, this could cause some plants and animals to go extinct, some to decline or increase in population, and others migrate to areas with more favorable conditions. For example, along the coast, fish that need colder temperatures to survive could migrate north, while more tropical varieties could move up the coast into Florida.
- Diseases and pests with current tropical ranges could invade Florida, as has West Nile virus and Africanized honey bees in Florida's panhandle.
- Crops and trees that need cooler climates may not grow as well in Florida, while more tropical varieties might do better.
- More severe storms and droughts could affect crop production, pests, and growth rates.

GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and several hydrocarbons (HCs) and chlorofluorocarbons (CFCs). Each GHG has an estimated global warming potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the Earth's surface. The GWP of a particular gas provides a relative basis for calculating its carbon dioxide equivalent (CO_2-e) or the amount of CO_2 that emissions of that gas would be equal to. CO_2 has a GWP of 1, and is, therefore, the standard by which all other GHGs are measured.

Federal Regulations on GHGs – The USEPA has promulgated several final regulations involving GHGs either under the authority of the CAA, or as directed by Congress, but none of them apply directly to the proposed action. Under the CAA, USEPA has promulgated an endangerment finding involving motor vehicle tailpipe emissions of GHGs ("Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act," 74 Federal Register 66496, December 15, 2009); a regulation to control light duty automobile exhaust emissions of GHGs ("Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards," 75 Fed. Reg. 25324, May 7, 2010); and a tailoring rule establishing a Prevention of Significant Deterioration (PSD) thresholds for

major stationary sources of GHG ("Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule," 75 Federal Register 31514, June 3, 2010). In addition, as directed by Congress, USEPA promulgated a final GHG reporting rule ("Mandatory Reporting of Greenhouse Gases," 74 Federal Register 56260, October 30, 2009).

In its final endangerment finding, USEPA determined that GHGs threaten the public health and welfare of the American people and that GHG emissions from on-road vehicles contribute to that threat. In the light-duty vehicle rule precipitated by the endangerment finding, USEPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) finalized a joint rule to establish a national program consisting of new standards that apply to the manufacturers of model year 2012 through 2016 light-duty vehicles that would reduce greenhouse gas emissions and improve fuel economy. Resulting from the light-duty vehicle rule, USEPA believed that the tailoring rule for PSD and Title V permitting was necessary.

The tailoring rule is necessary because with promulgation of the GHG rule for light-duty vehicles, PSD and Title V applicability requirements are triggered for stationary sources of GHG emissions as of 2 January 2011. The rule establishes two initial phase-in steps. Step 1 begins on 2 January 2011, and covers only sources and modifications that would otherwise undergo PSD or Title V permitting based on emissions of non-GHG pollutants. No additional PSD permitting actions or Title V permitting would be necessary solely due to GHG emissions during this period. However, a Best Available Control Technology (BACT) review of the GHG emissions may be required if the PSD permit process is under way for non-GHG emissions and the net increase in GHG emissions exceeds 75,000 tons per year (tpy) carbon dioxide equivalent (CO_2-e). Sources with Title V permits must address GHG requirements when they apply for, renew, or revise their permits. Step 2 begins on 1 July 2011, and covers new large sources of GHG emissions that have the potential to emit 100,000 tpy CO_2-e or more (provided that they also emit GHGs or some other regulated New Source Review (NSR) pollutant above the 100/250 tpy (mass based) statutory thresholds), and modifications at existing sources that increase net GHG emissions by 75,000 tpy CO_2-e or more, (provided that it also results in an increase of GHG emissions on a mass basis). GHG emission sources that equal or exceed the 100,000 tpy CO_2-e threshold would be required to obtain a Title V permit if they do not already have one.

Under the mandatory reporting rule, fossil fuel and industrial GHG suppliers, motor vehicle and engine manufacturers, as well as facilities that emit 25,000 metric tons or more of CO_2 equivalent per year, would be required to report GHG emissions data to USEPA annually. The first annual reports would cover calendar year 2010 and must be submitted to USEPA in early 2011. Affected facilities were required to have a monitoring plan in place by 1 April 2009.

On February 18, 2010, the CEQ released its *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*, which suggests that proposed actions that would be reasonably anticipated to emit 25,000 metric tons or more of carbon dioxide-equivalent (CO_2-e) GHG emissions should be evaluated by quantitative and qualitative assessments. This is not a threshold of significance but a minimum level that would require consideration in NEPA documentation. The purpose of quantifying GHG emissions in this EA is to aid in comparison of the alternatives, not to determine significance.

State Regulations on GHGs – In 2007, Florida's governor, Charlie Crist, signed three EOs regarding GHG emissions (FDEP 2009c). EO 07-126 requires state government measure their GHG emissions and work to reduce emissions by 10 percent by 2012, 25 percent by 2017, and 40 percent by 2025.

- EO 07-127 directed the adoption of maximum emission levels of GHGs for electric utilities that requires a reduction of emissions to year 2000 levels by 2017, to year 1990 levels by 2025, and by 80 percent of year 1990 levels by 2050.
- Florida would also adopt the California motor vehicle emission standards of 22 percent reduction in vehicle emissions by 2012 and a 30 percent reduction by 2016, pending approval of the USEPA waiver.
- EO 07-128 creates a Governor's Action Team on Climate Change that would be responsible for producing a Florida Climate Change Action Plan to include strategies beyond the EOs to reduce emissions. In addition, the team would include recommendations for proposed legislation for consideration during the 2008 legislative session and beyond.

Florida passed FAC 62-285, *Greenhouse Gas Emission Reduction*, which adopted the California Motor Vehicle Emission Standards (62-285.400), Heavy-Duty Vehicle Idling Reduction (62-285.420), and Clean Diesel Rebate Program (62-285.421) (FAC 62-285). Currently Florida does not have a set standard or rule regarding GHG emission reporting. FDEP initiated three rulemaking projects aimed at reducing Florida's GHG emissions (FDEP 2009d):

- Rules to reduce GHG emissions from electric utilities,
- Adoption of the California motor vehicle emissions standards, and
- Development of a diesel idle reduction standard.

Florida is a member of the Climate Registry, which allows it to collaborate with nearly 30 other states to create industry guidelines for emissions reporting. The Climate Registry is committed to standardizing best practices in greenhouse gas emissions data reporting and management, establish a set of common protocols, and support a common reporting system. The Climate Registry ensures consistency between state climate programs (FDEP 2009a) and is a tool to measure, track, verify, and publicly report GHG emissions from any entity wishing to participate (i.e., corporations, state agencies, municipalities, educational institutions and non-profit groups) (FDEP 2009b).

Air Force Guidance on GHGs - Based on the Air Force Energy Program Policy Memorandum (AFEPPM) disseminated 16 June 2009, the Air Force is evaluating and developing protocols allow it to identify, quantify, and manage greenhouse gas emissions as well as potential carbon offsets. These would include point and mobile sources as well as direct and indirect emissions resulting from Air Force operations (AFPM 10-1.1). The Air Force Materiel Command (AFMC) created a guide to assist their bases in the development of GHG emission inventories in preparation for upcoming federal and/or state regulations. This plan is based on recommendations provided in the GHG Inventory Guidance for AFMC (CH2M Hill/GEOMET 2008).

3.4.2 Affected Environment

Tyndall AFB is located in Bay County, which would be the affected environment used for this analysis. Bay County is in attainment for all criteria pollutants (USEPA 2011). Baseline emissions for Bay County utilized in this document are presented in Table 3–11, which were acquired from the USEPA's 2002 National Emissions Inventory (NEI) data for Okaloosa County (USEPA 2002). The county data includes emissions data from point, area, and mobile sources. Point sources are stationary sources that can be identified by name and location. Area sources are point sources of emissions too small to track individually, such as individual homes, small office buildings, or diffuse stationary sources (e.g., wildfires or agricultural tilling equipment). Mobile sources are vehicles or equipment with gasoline or diesel engines (e.g., an airplane or a ship). Two types of mobile sources are considered: on-road and non-road. On-road mobile sources are vehicles such as cars, light trucks, heavy trucks, buses, engines, and motorcycles. Non-road sources are aircraft, locomotives, diesel and gasoline boats and ships, personal watercraft, lawn and garden equipment, agricultural and construction equipment, and recreational vehicles (USEPA 2009b). Baseline aircraft emissions are presented in Table 3–12.

Table 3–11. Baseline Emissions Inventory for Bay County

Source Type	Emissions (tons/year)				
	CO	NO_x	PM_{10}	SO_2	VOC
Area Source	475	213	6,655	434	4,162
Non-Road Mobile	14,636	1,631	204	206	2,587
On-Road Mobile	34,649	3,698	101	191	3,267
Point Source	6,293	7,203	2,973	16,143	1,413
Total	**56,054**	**12,746**	**9,934**	**16,974**	**11,429**

Key:
CO = Carbon Monoxide
NOx = Nitrogen Oxide
SO_2 = Sulfur Oxide
PM_{10} = Particulate Matter with a diameter of less than or equal to 10 microns
VOC = Volatile Organic Compound

Source: USEPA 2002

Table 3–12. Baseline Aircraft Emissions Compared to Bay County

Aircraft Type	Emissions (tons/year)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
F-15A	1,467.72	787.01	141.63	141.63	65.07	298.84
F-22 Training	1,091.44	529.86	93.60	93.60	69.80	157.05
F-22 Operational	0.00	0.00	0.00	0.00	0.00	0.00
T-38	0.00	0.00	0.00	0.00	0.00	0.00
Total	**2,559.00**	**1,317.00**	**235.00**	**235.00**	**135.00**	**456.00**
Bay County Emissions	56,054	12,746	9,934	3,275	16,974	11,429
Percent of County Emissions	4.57%	10.33%	2.37%	7.18%	0.79%	3.99%

Key:
CO = Carbon Monoxide
NOx = Nitrogen Oxide
SO_2 = Sulfur Oxide
$PM_{2.5}$ = Particulate Matter with a diameter of less than or equal to 10 microns
PM_{10} = Particulate Matter with a diameter of less than or equal to 10 microns
VOC = Volatile Organic Compound

Source: USEPA 2002

Greenhouse Gas (GHG) - The potential effects of GHG emissions from the Proposed Action are by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the No Action Alternative and the Proposed Action Alternatives have been quantified to the extent feasible in this EA for information and comparison purposes.

3.5 Physical Resources

3.5.1 Resource Definition and Applicable Laws

Physical Resources – Physical resources include topography, geology, soils, and water. Geologic resources of an area typically consist of surface and subsurface materials and their inherent properties. Topography refers to an area's surface features including its vertical relief. These features may have scientific, historical, economic, and recreational value. The term "soils" refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. Characteristics of soils such as drainage, texture, strength, shrink/swell potential, pH, and erosion potential all determine the suitability of the ground to support manmade structures and facilities.

Water Resources – Water resource include surface water, groundwater quantity and quality, and floodplains (wetlands are discussed in Biological Resources/Land Use, Section 3.6). Surface water resources include lakes, rivers, and streams and are important for a variety of reasons including economic, ecological, recreational, and human health. Groundwater includes the subsurface hydrologic resources of the physical environment and its properties are often described in terms of depth to aquifer or water table, water quality, and surrounding geologic composition.

Waters of the U.S. - Section 404 of the Clean Water Act (CWA) established a program to regulate the discharge of dredge and fill material into waters of the U.S. Activities in waters of the U.S. that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. Under the CWA, it is illegal to discharge pollutants from a point source into any surface water without a National Pollutant Discharge Elimination System (NPDES) permit. The USEPA has the authority to set standards for the quality of wastewater discharges.

The goal of the CWA Section 402 is the "restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters." Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the U.S. must obtain certification from the state where the discharge would originate, or if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate (USEPA 2009a). All projects that have a federal component and may affect state water quality (including projects that require federal agency approval [such as issuance of a Section 404 permit]) must also comply with CWA Section 401. The state of Florida, through the Florida Department of Environmental

Protection (FDEP), has legal authority to implement and enforce the provisions of the CWA, while the USEPA retains oversight responsibilities.

The NPDES stormwater program, implemented by FDEP, regulates point source discharges of stormwater into surface waters of the state of Florida from certain municipal, industrial, and construction activities. As the NPDES stormwater permitting authority, FDEP is responsible for promulgating rules and issuing permits, managing and reviewing permit applications, and performing compliance and enforcement activities.

Section 438 of the Energy Interdependence and Security Act (EISA) of 2007 requires that any development or redevelopment project at a federal facility in excess of 5,000 square feet utilize site planning, design, construction, and maintenance strategies necessary to maintain and restore (to the maximum technically feasible extent) the hydrologic conditions of the site prior to construction with respect to temperature, rate, volume, and duration of flow.

3.5.2 Affected Environment

3.5.2.1 Topography

Tyndall AFB is located in the East Gulf Coastal Plain physiographic province, which is a nearly level, low coastal plain traversed by numerous large streams and marked by lakes and ponds. The topography of Tyndall AFB can be separated into two distinct areas: coastal and interior. Coastal portions of the base include sand dunes, beaches, bayous, and tidal marshes at or near sea level. Interior portions of the base contain gently sloping uplands, flatwoods, and wetlands (Tyndall AFB 2004).

Elevations range from sea level to approximately 20 feet above sea level at the inland portions of the peninsula. The FAA lists the runway's field elevation at 17 feet above sea level with a base elevation of 14 feet above sea level (FAA 2011).

3.5.2.2 Geology

The surface geology of Tyndall AFB consists of Quaternary (1.8 million years ago [Ma] to present) sediments composed largely of fine to coarse-grained sands, silty sands, and silty clay. Closest to the Gulf of Mexico, in southern portions of the peninsula, are Holocene (~0.01 Ma to present) sediments and in northern portions of the peninsula are undifferentiated sediments of Pleistocene/Holocene age (2.6 Ma to present). Underlying the surface are units of the Intracoastal Formation, a Lower Miocene (11.6 - 5.3 Ma), very sandy, microfossil bearing, poorly consolidated limestone interlaced with silica-rich fine-grained deposits (Tyndall AFB 2006).

3.5.2.3 Soils

A soil-mapping unit represents an area that is dominated by one major kind of soil, or an area dominated by several kinds of soils (referred to as a series). Each of the soil map units described has minor soils that are encompassed within the map unit. These minor soils may have different properties and limitations that can only be delineated onsite. The properties and limitations of the soil type that comprise the majority of each soil map unit are presented in this section to provide an indication of the conditions and limitations found in the project area.

Tyndall AFB has 13 distinct soil series and numerous distinct soil-mapping units. Soils at Tyndall AFB are predominately sandy, acidic, poorly drained, have low shrink-swell potential, and are relatively close to the underlying water table. General soil types present on Tyndall AFB are shown in Figure 3–3. Characteristics of the predominant soil series in areas affected by construction and renovation activities of the Proposed Action are summarized in Table 3–13 and are shown in Figure 3–4. Descriptions of soil series are derived from the Soil Survey of Bay County Florida (USDA 1984), Official Series Descriptions of the Natural Resources Conservation Service (NRCS) (USDA 2009), and the NRCS Web Soil Survey online data resource (USDA 2010).

Pits are areas from which soil has been excavated for use in construction or as fill material. Areas would vary in depth, size, and shape. Urban land consists of areas that are 75 percent or more covered with streets, houses, parking lots, runways, or other related facilities. Urban land at Tyndall AFB can include very small areas of Leon, Pottsburg, and Rutlege soils (Table 3–13). Other areas can be made up of undifferentiated or disturbed soil material.

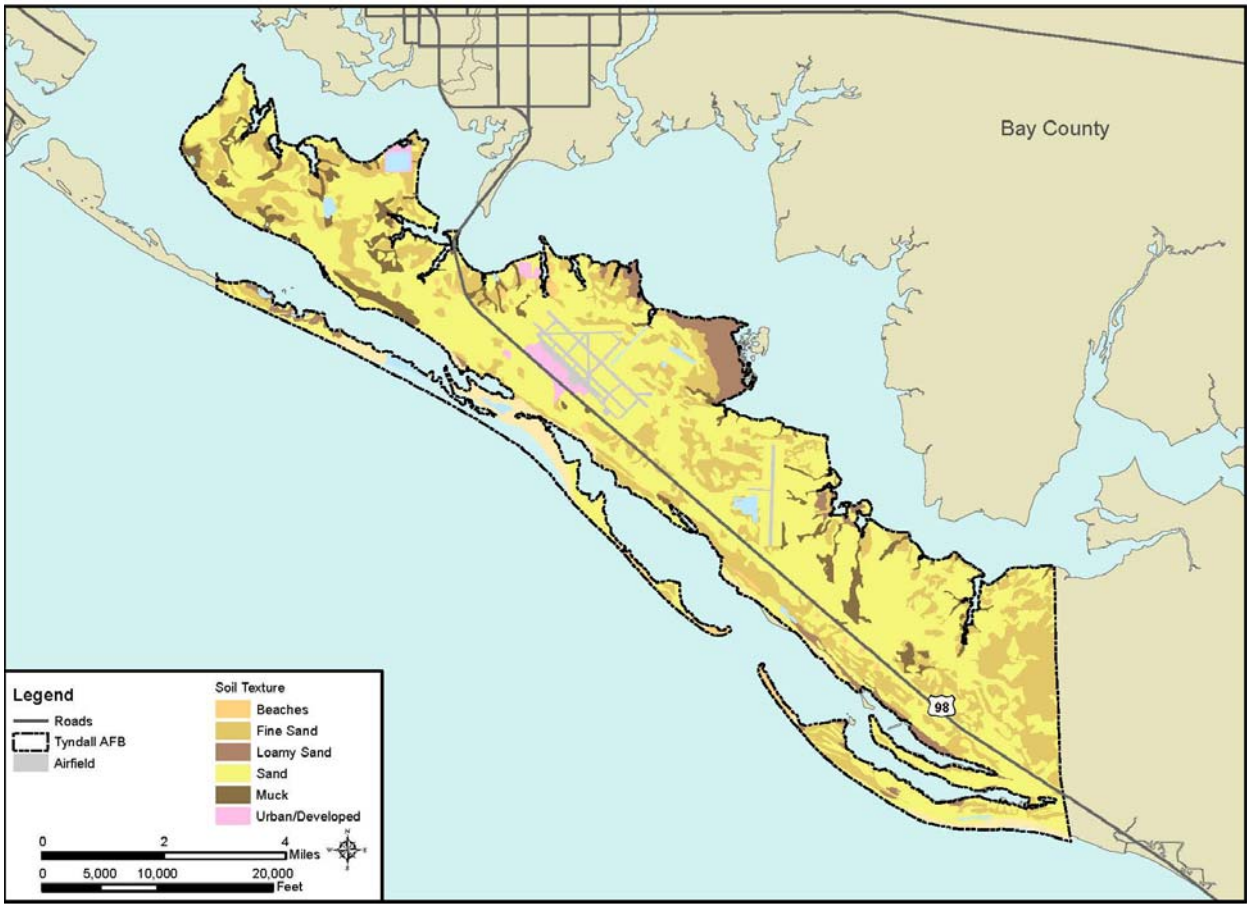

Figure 3–3. General Soil Types on Tyndall AFB

Table 3–13. Selected Characteristics of Soils in Proposed Construction/Renovation Areas on Tyndall AFB

Soil Series	Average pH*	Location Description	Permeability	Surface Runoff	Drainage Class	Depth to Water Table	Frequency of Flooding/ Ponding	Available Water Capacity	Limitation for Shallow Excavations/Development	Corrosion Risk: Concrete/ Uncoated Steel
Arents	6.6	rises on marine terraces	variable	negligible	somewhat poorly drained	18-36 inches	none/none	very low (~2.4 in)	very limited: unstable excavation walls	high/low
Bayvi Loamy Sand	4.1	tidal marshes of marine terraces	rapid or very rapid, internal drainage is very slow due to high water table	very high	very poorly drained	0-12 inches	very frequent/ none	very low (~1.2 in)	very limited: flooding; depth to saturated zone/water table; unstable excavation walls	high/high
Hurricane Sand	5.1	flats and rises of marine terraces	very rapid (surface and subsurface), moderately rapid (subsoil)	negligible	very poorly drained	24-36 inches	none/none	low (~3.4 in)	very limited: depth to saturated zone/water table; unstable excavation walls	moderate/ low
Leon Sand	4.8	flatwoods on marine terraces	rapid (surface and subsurface), moderate moderately rapid (subsoil)	high	poorly drained	6-18 inches	none/none	very low (~2.8 in)	very limited: depth to saturated zone/water table; unstable excavation walls	high/high
Mandarin Sand	4.8	flats and rises of marine terraces	rapid (surface and subsurface), moderate (subsoil)	very low	somewhat poorly drained	18-42 inches	none/none	low (~5.5 in)	very limited: depth to saturated zone/water table; unstable excavation walls	high/ moderate
Osier fine Sand	4.3	depressions on marine terraces and flatwood areas	rapid, internal drainage is very slow due to high water table	negligible	poorly drained	0-6 inches	none/ frequent	low (~3.4 in)	very limited: ponding; depth to saturated zone/water table; unstable excavation walls	high/high
Pickney Sand	4.8	depressions on marine terraces	rapid, internal drainage is very slow due to high water table	negligible	very poorly drained	0-12 inches	occasional /frequent	moderate (~6.6 in)	very limited: ponding; depth to saturated zone/water table; unstable excavation walls; flooding	high/high
Pottsburg Sand	4.8	flats on marine terraces	rapid (surface and subsurface) moderate (subsoil), internal drainage is very slow due to high water table	negligible to very low	poorly drained	0-6 inches	none/none	low (~4.2 in)	very limited: depth to saturated zone/water table; unstable excavation walls	high/high
Resota Sand	5.3	ridges and knolls of marine terraces	very rapid	negligible	moderately well drained	42-60 inches	none/none	very low (~2.4 in)	very limited: depth to saturated zone/water table; unstable excavation walls	high/high
Rutlege Sand	4.8	depressions on marine terraces	rapid, internal drainage is very slow due to high water table	negligible	very poorly drained	0-6 inches	none/none	low (~3.4 in)	very limited: ponding; depth to saturated zone/water table; unstable excavation walls	high/high

Note: * pH relative scale: 0 = acid, 7 = neutral, 14 = alkaline
Source: USDA 1984, USDA 2009, and USDA 2010

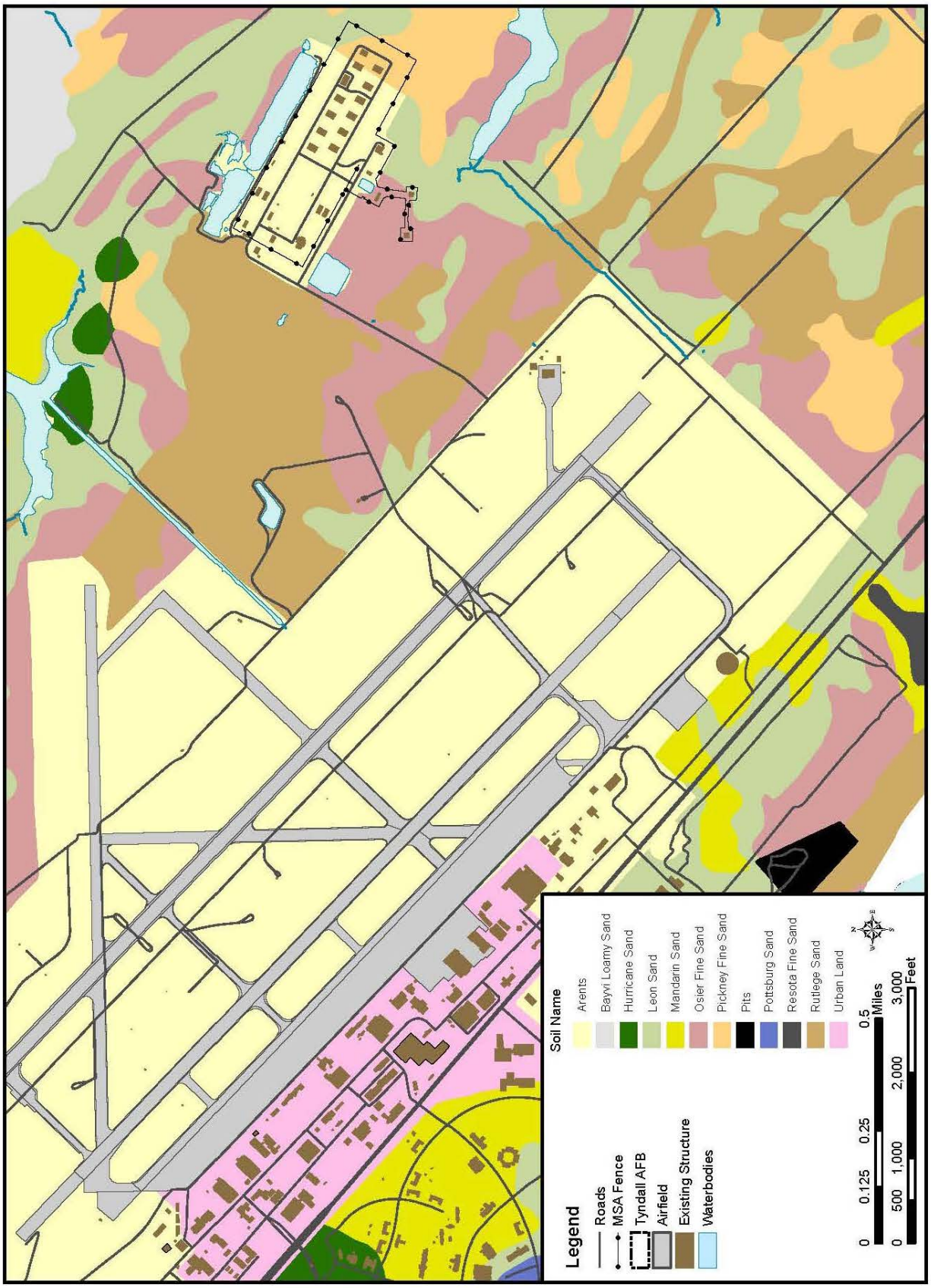

Figure 3–4. Soils in Areas of Construction and Renovation Activities

3.5.2.4 Water Resources

Surface Water - Tyndall AFB is located within the Saint Andrew Bay Watershed, the only major estuarine drainage entirely within the panhandle of Florida. The watershed covers approximately 749,700 acres distributed over six counties, the largest percentage of which is found in Bay County. Major surface water features of this watershed include the Gulf of Mexico; the interconnected Saint Andrew; West, East, and North Bays; Saint Joseph Bay; Deer Point Reservoir; and Saint Andrew Sound (NWFWMD 2000). Tyndall AFB has several freshwater lakes, some artificially created by excavation or impoundment, while others (coastal dune lakes) developed naturally from coastal land processes. The largest natural lake on Tyndall AFB is Felix Lake, a non-coastal dune lake in the northern part of the base. In general, surface water drains northward in areas north of U.S. Highway 98 and southward in areas south of U.S. Highway 98 (Tyndall AFB 2006). The base has approximately 51 miles of storm drainage lines. Most stormwater percolates into the ground quickly (especially in areas dominated by sandy soil types) so surface drainage is adequate in most parts of the base (Tyndall AFB 2004). Major water features at Tyndall AFB are shown in Figure 3–5.

Other notable surface water bodies on or near Tyndall AFB include: Wild Goose Lagoon, Blind Alligator Bayou, Strange Bayou, Shoal Point Bayou, Fred Bayou, Pearl Bayou, Freshwater Bayou, Sheephead Bayou, and Smack Bayou. There are no named rivers on Tyndall AFB, but several unnamed sinuous watercourses branch inland from the major bayous.

Tyndall AFB currently operates under a Multi-Sector Generic Permit issued by the FDEP on 19 June 2006 and is permitted under the Industrial Sector "S," Air Transportation Facilities, of the NPDES to operate facilities and discharge stormwater to surface waters. The NPDES stormwater permitting program is separate from Florida's stormwater/environmental resource permitting programs and local stormwater/water quality programs, which maintain their own regulations and permitting requirements (Tyndall AFB 2007b).

Developed areas (less than 15 percent of the total base area has been developed) at Tyndall AFB have seven distinct drainage areas (A through G) from which surface waters in industrial areas of the base drain to receiving waters off-base (Figure 3–5 and Figure 4–5). Outfalls A, B, E, and F discharge into Shoal Point Bayou, which is located to the northwest of the base and is the major receiving water to the north. Outfall C discharges into Little Cedar Bayou, located northeast of the base. Outfall D discharges into Saint Andrew Sound, located to the south of the base. Outfall G discharges into East Bay, located to the northeast of the base. Descriptions of outfall areas are taken from the base Stormwater Pollution Prevention Plan (SWPPP) (Tyndall AFB 2007b). A summary of each outfall is provided in Table 3–14. In Chapter 4 (Figure 4–5), outfall areas located near the developed areas on Tyndall AFB are shown in relationship to the Proposed Action and Alternative 1.

The drainage areas serviced by the outfall areas described in Table 3-14 include a variety of industrial activities which may include the use of jet fuel, oil, diesel fuel, hydraulic fluids, antifreeze, solvents, paints, degreasers, detergents, hazardous waste, and Aqueous Film Forming Foam (AFFF) agents. In particular, Outfall A includes approximately 30 buildings supporting these same industrial activities. Drainage areas serviced by Outfalls E and F include aboveground and underground storage tanks containing fuel liquids and contain the greatest volume of fuel and other materials.

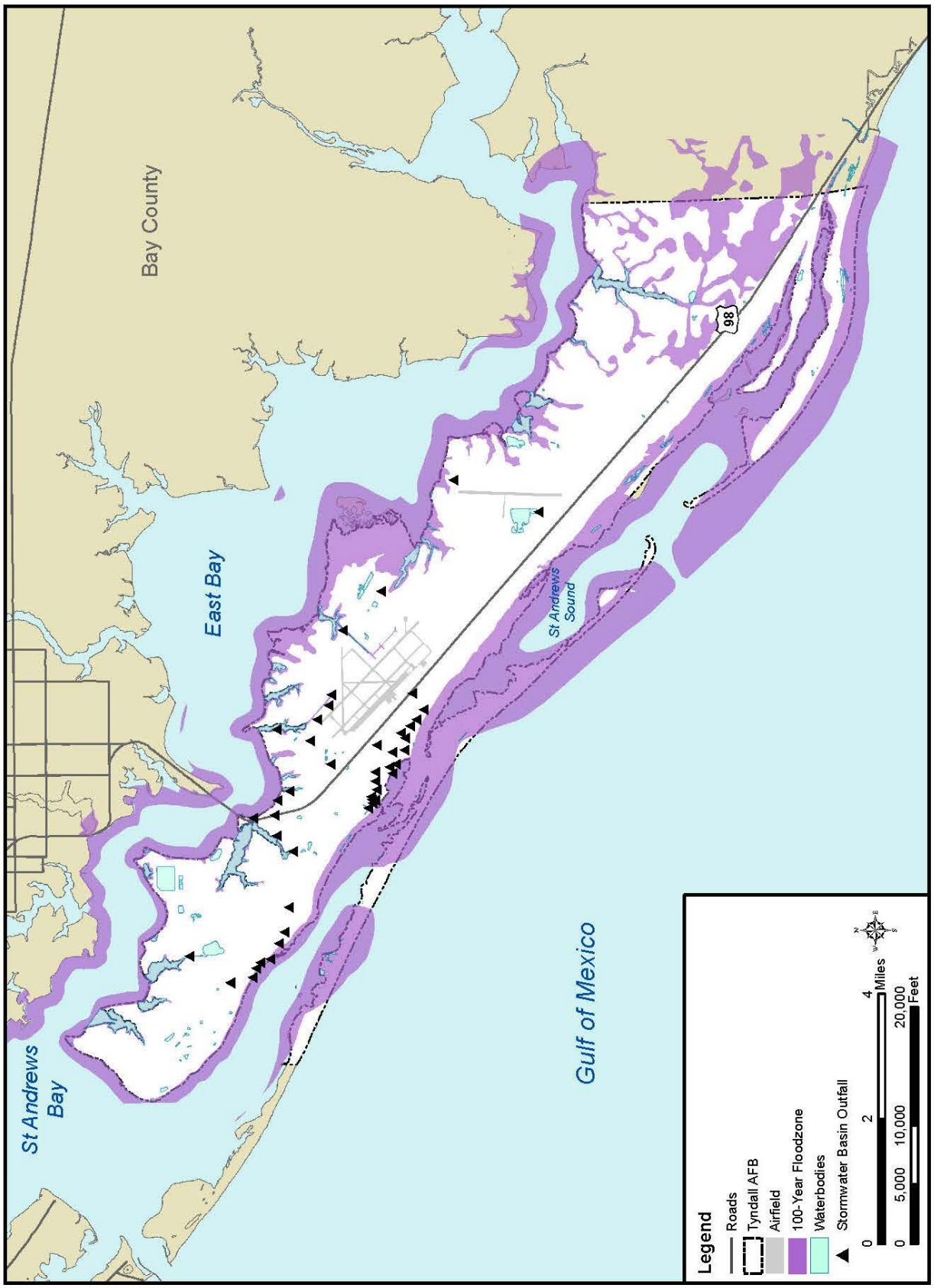

Figure 3–5. Major Water Features at Tyndall AFB

Table 3–14. Stormwater Outfall Areas in Industrial Areas of Tyndall AFB

Outfall	Drainage Area (acres)	Impervious Surface Area (%)	Description of Primary Industrial Activity	Location	Receiving Water
A	200	47	Runway, hangars	Northwest end of runway	Shoal Point Bayou
B	360	34	Runway, hangars	Northern third of runway	Shoal Point Bayou
C	760	40	Runway, hangars	Majority of active runway	Little Cedar Bayou
D	35	65	Hangars	Western end of support side	Unnamed tributary of Saint Andrew Sound
E	14	87	Fuels Management Area	West of the runway	Shoal Point Bayou
F	13	61	Fuel barge off-loading area	Shoal Point Bayou (north of runway)	Shoal Point Bayou
G	1,544	7	Full-scale drone runway	Central Portion of Base	East Bay

Source: Tyndall AFB 2007b

Groundwater - Tyndall AFB operates and maintains its own potable water distribution system. The shallowest source of groundwater at Tyndall AFB is the Florida Aquifer consisting primarily of 1,100 feet of limestone and dolomite, the upper portions of which provide potable water for most of the Florida Panhandle. Some of the potable water used by Tyndall AFB is pumped from the Florida Aquifer by permitted wells, which are filtered and chlorinated prior to use (Tyndall AFB 2006). There are four large wells in the main base area used as backup sources for the base potable water system. In addition, a few remote areas of the base have active water wells (Tyndall AFB 2004).

3.6 Biological Resources

3.6.1 Resource Definition and Applicable Laws

Biological resources include living, native, or naturalized plant and animal species and the habitats in which they occur. For this analysis, biological resources are divided into two primary categories, terrestrial and marine.

3.6.1.1 Terrestrial Biological Resources

Terrestrial biological resources include vegetative communities, wildlife (including mammals and bird species), federal and state threatened and endangered species, or state listed species of concern, and wetlands.

The primary vegetative communities located on Tyndall AFB include mesic/wet slash flatwoods; natural longleaf pine; estuarine tidal marsh; coastal upland; wet prairie, basin swamps, baygall, and floodplain swamps; slash scrub; sand pine scrub; and maritime hardwood hammock. Turf and landscaped areas also exist on Tyndall AFB. The Tyndall AFB land management plan establishes procedures for vegetative cover and landscaping of improved and semi-improved lands including acceptable species for trees, shrubs, and grasses (Tyndall AFB 2006).

An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. A species of management concern is likely to be listed in the near future and the USFWS urges that conservation measures be taken and consideration be given to their protection in environmental

planning. State species of concern or special concern are considered rare in Florida, but are not otherwise listed. The USFWS is responsible for the recovery of federally listed threatened and endangered species under the ESA of 1973. The FWC provides management support for wildlife at the state level. Plant and animal species designated as threatened, endangered, or species of concern include:

- Plant and animal species that are federally listed as endangered, threatened, or a species of management concern by the USFWS;
- Plant species that are state listed as endangered, threatened or species of special concern by the Florida Department of Agriculture and Consumer Services (FDACS);
- Animal species that are state listed as endangered, threatened or species of special concern by the Florida Fish and Wildlife Conservation Commission (FWC); or
- Plant and animal species listed as a species of concern by the Florida Natural Areas Inventory (FNAI).

Wetlands are defined in the U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE 1987). The majority of jurisdictional wetlands (wetlands that fall under state or federal regulatory authority) in the U.S. are described using the three criteria for wetland delineation: hydrophytic vegetation, hydric soils, and hydrology (USACE 1987).

Wetlands are areas of transition between terrestrial and aquatic systems where the water table is usually at or near the surface. Conversely, these can occur where shallow water covers land (USFWS 1979). Factors such as morphology, hydrology, water chemistry, soil characteristics, and vegetation contribute to the diversity of wetland community types. The term *wetlands* describe marshes, swamps, bogs, and related areas. Local hydrology and soil saturation affects soil formation and development as well as the plant and animal communities found in wetland areas (USEPA 1995). One of the most important factors in establishing and maintaining wetland processes is wetland hydrology, which is the inflow and outflow of water through a wetland and its interaction with other site characteristics (Mitsch and Gosselink 2000).

3.6.1.2 Marine Biological Resources

Marine biological resources may occur within the Gulf of Mexico or in St. Andrew Bay. Marine resources include plant and animal species that inhabit the water column and birds that occur in the area. Species occurring in the water column may be categorized as plankton (free-floating plants or animals with weak or no swimming ability), benthic species (plants or animals living in or on the sea floor or other submerged surface), and nekton (organisms that can move independently of ocean currents).

Plankton ranges in size from microscopic organisms to larger animals such as jellyfish. Benthic species include such organisms as algae, sponges, seagrass, and coral. Free-swimming animals include fish, marine mammals, and sea turtles, among others. A number of shorebirds, wading birds, and diving birds occur in the area. Several marine species designated as threatened or

endangered occur in the Gulf of Mexico. Listed species include fish, birds, marine mammals, and sea turtles.

3.6.1.3 Laws and Regulations

- **ESA of 1973 (16 USC 1531 to 1544; 1997–Supp) –** This USC was enacted to provide or the conservation of endangered and threatened species and the ecosystems on which they depend.
- **AFI 32-7064, *Integrated National Resource Management* –** Provides details on how to manage natural resources in such a way as to comply with federal, state, and local laws and regulations.
- **The Bald Eagle Protection Act (16 USC 668–668d) –** Prohibits the taking or possession of and commerce in bald eagles.
- **The Migratory Bird Treaty Act (MBTA) (16 USC 703-712; 1997-Supp) and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* -** Protects migratory birds and their habitats and establishes a permitting process for legal taking.
- **Section 404 of the CWA (30 CFR 330) and Section 10 of the Rivers and Harbors Act (30 CFR 329) –** Provides USACE with jurisdiction over federal wetlands (33 CFR 328.3).
- **EO 11990, *Protection of Wetlands* -** Directs agencies to avoid to the extent possible adverse impacts to wetlands and to avoid support of new construction in wetlands wherever there is a practicable alternative.
- **Chapter 62-312 of the FDEP, *Dredge and Fill Program* -** Affords regulatory protection to wetland resources (protection from excavating or filling a wetlands area with dirt, riprap, and so on) at the state level through issuance of a Section 401 certification under the authority of the CWA (40 CFR 230.10[b]).
- **Section 401 of the CWA -** Requires federal agencies to obtain certification from the state before issuing permits that would result in increased pollutant loads to a water body.
- **The Marine Mammal Protection Act of 1972 (MMPA) -** Establishes a comprehensive federal plan to conserve marine mammals, including a moratorium on the "taking" of all marine mammals.
- **The Magnuson-Stevens Fishery Conservation and Management Act -** Governs the conservation and management of ocean fishing.
- **EO 13158, *Marine Protected Areas* -** Protects significant natural and cultural resources within the marine environment.

3.6.2 Affected Environment

3.6.2.1 Terrestrial Biological Resources

Vegetative Communities - Tyndall AFB is located in the southern portion of Bay County, Florida. The base encompasses 28,460 acres of a peninsula that forms the southeastern shoreline of St. Andrews Sound. Tyndall AFB lies within the gulf coastal lowlands physiographic region (Puri and Vernon 1964) and is located in the southern evergreen forest region of the outer west coastal plain. This region is typified by the presence of longleaf pine and scrub oak forests (Tyndall AFB 2006).

Vegetation found on Tyndall AFB is consistent to that within the eco-region described above. Much of the historical vegetation of Tyndall AFB has been altered by past human activity such as agricultural and silvicultural activities that occurred prior to the base's inception. Sand and slash pine plantations have replaced much of the native longleaf pine communities for timber production. Although Tyndall AFB manages pine plantations for commercial harvest, the focus of the forest programs has shifted to less commercial strategies and more towards the restoration of historic vegetative communities and conditions through natural regeneration of native species, prescribed burning, and selective forest thinning. The 2006 Tyndall AFB Integrated Natural Resources Management Plan (INRMP) has set goals for the restoration of longleaf pine communities so the installation is restoring approximately 200 acres of sand pine scrub into longleaf pine each year (Tyndall AFB 2006).

Biological surveys of the area found nine distinct vegetation areas dominated by mesic/wet slash flatwoods, natural longleaf pine, sand pine scrub, maritime hardwood hammock, coastal upland, tidal salt marsh, slash scrub, and freshwater wetlands (wet prairie, basin swamp, baygall, and floodplain swamps) intermixed and found throughout the installation (Tyndall AFB 2006). Turf grasses and other landscaping vegetation have been planted on semi-improved and improved areas on Tyndall AFB. The installation's land management program determines acceptable species for landscaping grasses, shrubs, and trees for these areas (Tyndall AFB 2006).

The primary ecological associations found within the land areas covered by the Tyndall MOAs include sandhills, open grassland/shrubland, sand pine, flatwoods, swamp, salt marsh, and coastal strand. These ecological associations are comprised of many different habitats, each contributing a diverse mixture of wildlife and plants. Appendix D provides a description of each of these ecological associations. Out of the 1.9 million acres of land area covered by the Tyndall MOAs, approximately 1.3 million acres are considered "natural areas" (described as regions of unspoiled, high quality natural communities important to wildlife conservation). These areas are usually contained within managed areas such as National Forests (NF) and state parks or preserves, and are important for maintaining ecosystem function and diversity while providing aesthetics and recreation.

Wildlife - Wildlife at Tyndall AFB is consistent with that expected to occur in the various habitats and vegetative communities described above. Inventories of the installation's fish and wildlife species are based on studies conducted by 325 Civil Engineer Squadron (CES)/Civil Engineer Environmental Flight, Natural Resources Element (CEVN) and Florida Natural Areas Inventory (Tyndall AFB 2006). Common species observed on the installation include bob-white quail (*Colinus virginianus*), gray squirrel (*Sciurus carolinensis*), marsh rabbit (*Sylvilagus palustris*), mourning dove (*Zenaida macroura*), oldfield mice (*Peromyscus polionotus*), white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo osceola*), black bear (*Ursus americanus*) and wood duck (*Aix sponsa*) (Tyndall AFB 2006). Wildlife species commonly found in each of the ecological associations covered by the Tyndall MOAs are provided in Appendix D.

Threatened, Endangered, and Special Status Species/Communities - The variety of habitats available within the boundaries of Tyndall AFB yield a diverse plant and animal population. There are 22 listed plant species, including one federally listed species, documented on near Tyndall AFB (Table 3–15). Most plant species at Tyndall AFB occur on the barrier islands or within wetlands where interaction with the military mission are minimal.

Table 3–15. Listed Plant and Animal Species Document Located At/Near Tyndall AFB

Name Common / Scientific		Federal Status	State Status	Natural Community
Plants				
Apalachicola Dragonhead	*Physostegia godfreyi*		T	wet prairie
Bog Tupelo	*Nyssa ursine*	SC		wet prairie
Chapman's Butterwort	*Pinguicula planifolia*	SC	T	wet prairie
Chapman's Crownbeard	*Verbesina chapmanii*	SC	T	wet prairie
Decumbent pitcher plant	*Sarracenia purpurea*		T	wet prairie, bogs
Dew Thread Sundew	*Drosera filiformis*		E	wet prairie
Drummond's Yellow-eyed Grass	*Xyris drummondii*	SC		wet prairie, flatwoods
Florida Skullcap	*Scutellaria floridana*	T	E	wet pine flatwoods, grassy margins of cypress stringers, seepage slopes, transition zones between flatwoods and wetlands
Giant Water Dropwort	*Oxypolis greenmanii*		E	wet prairie, ditches
Godfrey's Golden Aster	*Chrysopsis godfreyi*	SC	E	dunes
Gulf Coast Lupine	*Lupinus westianus*	SC	T	scrub, dunes
Harper's Yellow-eyed Grass	*Xyris scabrifolia*	SC	T	wet prairie
Henry's Spider Lily	*Hymenocallis henryae*	SC	E	cypress stringers
Karst Pond Yellow-eyed Grass	*Xyris longisepala*	SC	E	upland lake margin
Large-leaved Jointweed	*Polygonella macrophylia*	SC	T	scrub
Parrot pitcher plant	*Sarracenia psittacina*		T	wet prairie, bogs
Quillwort Yellow-eyed Grass	*Xyris isoetifolia*	SC	E	wet prairie
Southern Milkweed	*Asclepias viridula*	SC	T	wet prairie
Southern Red Lily	*Lilium catesbaei*		T	wet prairie
Spoon-leafed Sundew	*Drosera intermedia*		T	wet prairie
Telephus Spurge	*Euphorbia telephioides*	T	E	longleaf pine savannas, scrubby and mesic flatwoods, and coastal scrub
Thick-leaved Water Willow	*Justicia crassifolia*	SC	E	wet prairie
White Birds-in-a-nest	*Macbriden alba*	T	E	wet to mesic pine flatwoods
Violet-flowered Butterwort	*Pinguicula ionantha*	T	E	cypress domes
White-flowered Wild Petunia	*Ruellia noctiflora*		E	wet prairie
Birds				
American Oystercatcher	*Haematopus palliates*	SC	SSC	shoreline
Black Skimmer	*Rhychops niger*	SC	SSC	shoreline
Brown Pelican	*Pelecanus occidentalis*		SSC	barrier island, bays
Least Tern	*Sterna antillarum*	E	T	barrier island, shoreline
Little Blue Heron	*Egretta caerulea*		SSC	marshes, ponds, lakes
Peregrine Falcon	*Falco peregrinus*	SC	E	open habitats
Piping Plover	*Charadrius melodus*	T CH	T	barrier islands
Reddish Egret	*Egretta rufescens*	SC	SSC	brackish marsh, shallow coastline
Snowy Egret	*Egretta thula*		SSC	marshes, lakes, ponds, shallow coastline
Snowy Plover	*Charadrius alexandrinus tenuirostris*	UR	T	barrier islands
Southeastern American Kestrel	*Falco sparverius paulus*	SC	T	open, partly open habitat

Name Common / Scientific		Federal Status	State Status	Natural Community
Tricolor Heron	*Egretta tricolor*		SSC	marshes, ponds
White Ibis	*Eudocimus albus*	SC	SSC	marshes, lakes
Reptiles				
Alligator Snapping Turtle	*Macroclemys temmincki*	UR	SSC	freshwater lakes
American Alligator	*Alligator mississippiensis*	T (S/A)	SSC	lakes, marshes
Gopher Tortoise	*Gopherus polyphemus*	UR	T	longleaf pine, sand pine scrub
Green Sea Turtle	*Chelonia mydas mydas*	E	E	marine, barrier island
Gulf Salt Marsh Snake	*Nerodia clarkia clarkii*	SC		needle grass, estuaries
Kemp's Ridley Turtle	*Lepidochelys kempi*	E	E	marine
Leatherback Sea Turtle	*Dermochelys coriacea*	E	E	marine, barrier island
Loggerhead Sea Turtle	*Caretta caretta*	T	T	marine, barrier island
Mammals				
Choctawhatchee Beach Mouse	*Peromyscus polionotus allophyrs*	E CH	E	barrier island
Florida Black Bear	*Ursus americanus floridanus*		T	swamps, forested areas
Manatee	*Trichechus manatus*	E	E	marine
St. Andrews Beach Mouse	*Peromyscus polionotus peninsularis*	E	E	barrier island
Fish				
Gulf sturgeon	*Acipenser oxyryinchus desotoi*	T CH	SSC	marine, large rivers

Key:
SC = Species of Concern
E = Endangered
SSC = Species of Special Concern
T = Threatened
T (S/A)= Threatened by Similarity of Appearance
CH = Critical Habitat designated
UR = Under Review by U.S. Fish and Wildlife Service

Sources: Tyndall AFB 2006; USFWS 2009; USFWS 2011a; and FWC 2011.

Table 3–15 presents the listed species documented on or near Tyndall AFB and the habitat types they utilize including eight species of reptiles, 13 species of birds, one species of fish, and four species of mammals. Eleven of these species are federally listed as threatened or endangered. Species designated as species of concern or species of special concern are species or populations which warrants special protection, recognition, or consideration because it has an inherent vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation, which may result in its becoming threatened in the foreseeable future.

Although not historically documented to occur on Tyndall AFB, Tyndall AFB is within the historic range for the Eastern indigo snake, Flatwoods salamander, and Gopher frog. Similar to the plant species, the majority of these species prefer habitats on the barrier islands or with wetland communities where there is minimal interaction with the military mission. The beaches of the barrier islands are important nesting sites for loggerhead sea turtles and several listed shorebirds (e.g., least tern and piping plover). The dune communities are vital habitat for the Choctawhatchee and St. Andrews beach mice. Hence, all beach and dune habitats of Shell Island, Crooked Island East, and Crooked Island West have been designated (by USFWS) as Critical Habitat Areas. The area runs from the shoreline to 1.5 miles out, from 1 April to 15 September (Tyndall AFB 2006). Sensitive species potentially found in each of the ecological associations covered by the Tyndall MOAs are provided in Appendix D.

Wetlands - Approximately 40 percent of Tyndall AFB is estimated to be wetland habitat (Tyndall AFB 2006). EO 11990, *Protection of Wetlands*, 24 May 1977 directs federal agencies to consider alternatives to avoid adverse effects and incompatible development in wetlands. Federal agencies are directed to avoid new construction in wetlands unless the agency finds there is no practicable alternative to construction in the wetlands and the proposed construction incorporates all possible measures to limit harm to the wetland. The CWA sets the basic regulatory framework for regulating discharges of pollutants to U.S. waters. Section 404 of the CWA establishes federal programs to regulate the discharge of both dredged and fill materials into waters of the U.S., including wetlands. Four federal agencies are responsible for identifying and regulating wetlands: the USACE, USEPA, USFWS, and U.S. Department of Agriculture NRCS. The USACE and USEPA are primarily responsible for making jurisdictional determinations and regulating wetlands under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the CWA. The NRCS has developed procedures for identifying wetlands for compliance with the Flood Security Act of 1985 and the USFWS has developed the National Wetlands Inventory (NWI) classification system for identifying wetlands.

Wetlands on Tyndall AFB have been mapped and classified in accordance with the USFWS NWI classification system as described in the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin *et al.* 1979). Based on the NWI classification system, the primary types of wetlands on the installation are palustrine aquatic/emergent, palustrine forested, and estuarine, with palustrine forested, which are the dominant type in terms of total coverage. Palustrine forested wetlands on Tyndall AFB primarily include basin swamps, baygalls, floodplain swamps, and hydric flatwoods. Palustrine aquatic/emergent wetlands include wet prairies and hydric herbaceous systems associated with interdunal swales and coastal lakes. Estuarine wetlands on Tyndall AFB are tidal salt marshes (Tyndall AFB 2006).

3.6.2.2 Marine Biological Resources

Plankton - The group of organisms referred to as plankton includes zooplankton (animals, including ichthyoplankton, or larval fish), phytoplankton (plant-like organisms), and smaller size classes such as nanoplankton, bacterioplankton, (bacteria) and virioplankton (viruses). Nanoplankton is considered the dominant grazers of marine bacteria and other picopankton and, as such, may be a significant link between bacteria and larger zooplankton in aquatic food webs. The zooplankton generally provides an important link between phytoplankton and higher trophic levels such as fish and marine mammals (Steidinger 1973). The types of plankton found in St. Andrews Bay and the Gulf of Mexico are expected to be similar even though there are differences in species composition between coastal and oceanic systems has been noted by some researchers (Boehme *et al.* 1993).

Invertebrates - Tens of thousands of marine invertebrate species have been identified, including crustaceans, cephalopods, mollusks, sponges, and corals, among many others. They range in size from less than a millimeter to several meters long and occupy a great diversity of habitats, including ocean sediments and the water column. In the northeastern Gulf of Mexico, benthic invertebrate species are typical of those found in sandy substrates. At least 1,497 species of invertebrate epibiota (organisms living on the substrate), including mollusks, crustaceans, cnidarians, echinoderms, and sponges, have been collected from live--bottom areas on the Florida shelf. More than 90 species of sponges and 53 species of scleractinian coral have been

identified (Phillips *et al.* 1990). Keppner (2002) reviewed literature reports of invertebrates occurring in the St. Andrews Bay estuary and identified a minimum of 1,837 species, the most numerous of which were annelids, arthropods, mollusks, and nematodes.

Hardbottom Areas – Consists of hard or rocky outcroppings or formations that support the growth of benthic species such as algae, sponges, and a few stony corals. Such areas also provide habitat for other animals such as crabs, lobsters, and fish. Only a small percentage of the sea floor near Tyndall AFB (warning areas W-151, W-155, and W-470) is considered hardbottom habitat (Table 3–16).

Table 3–16. Hardbottom Habitat in the Study Area

Warning Area	Coral Reef Area (km^2)	Scattered Coral Heads and Other Hardbottom Area (km^2)	Total Hardbottom Area (km^2)	Total Area Encompassed By Warning Area (km^2)	Percent Cover of Total Hardbottom Area (%)
W-151	76.74	0.00	76.74	36,650	0.21
W-155	103.69	0.00	103.69	18,873	0.55
W-470	508.48	870.45	1,378.93	25,599	5.39
Total	**688.91**	**870.45**	**1,559.36**	**81,032**	**1.92**

Key: km^2 = square kilometers
Source: DON 2009

Special Biological Resource Areas - Special biological resource areas are offshore habitats that contain unique flora and/or fauna and which often has some level of legal protection. They may be areas that are important as feeding grounds or principal places of productivity in the Gulf of Mexico. These ecosystems are considered distinct from the surrounding area and typically support a large variety of species. They occur on the continental shelf, slope, and deep sea floor within the eastern Gulf of Mexico (Figure 3–6). Special resource areas in the study area include the Florida Middle Grounds, Desoto Canyon Closed Area, Reef Fish Stressed Area, Steamboat Lumps and Madison-Swanson Spawning Sites, and St. Andrews Aquatic Preserve. The aquatic preserve, which supports a substantial quantity of seagrass, includes East and West Passes, Shell Island, and a portion of the St. Andrews State Recreation Area. The remaining areas are considered important for the sustainment of commercial fish species and certain fishing practices are restricted or prohibited.

Seagrasses - Seagrasses occur in estuaries, lagoons, and shallow open shelves off the coast of Florida. Grass beds are generally distributed close to shore in shallow waters with relatively high water clarity. Seagrass ecosystems are widely recognized as some of the most productive benthic habitats in estuarine and nearshore waters of the Gulf of Mexico (Neckles 1994), providing important ecosystems functions such as habitat and food supply. Seagrasses cover approximately 30,000 square kilometers (km^2) of the Gulf of Mexico, with approximately 10,000 km^2 of this total occurring in Florida waters (Sargent *et al.* 1995). Total grassbed coverage in Bay County is approximately 43 km^2. St. Andrews Bay contains the highest amount of seagrass coverage in northwest Florida (FDEP 2011) including five species: turtle grass (*Thalassia testudinum*), shoal grass (*Halodule wrightii*), manatee grass (*Syringodium filliforme*), widgeon grass (*Ruppia maritima*), and star grass (*Halophila englemanni*). Turtle grass is most abundant in St. Andrews Bay, while shoal and manatee grasses are also prevalent (NWFWMD 2000). A literature review on St. Andrews Bay found that shoal grass and widgeon grass were located around bayheads, while turtle grass was dominant in more pristine parts of the estuary system (SAIC 1997).

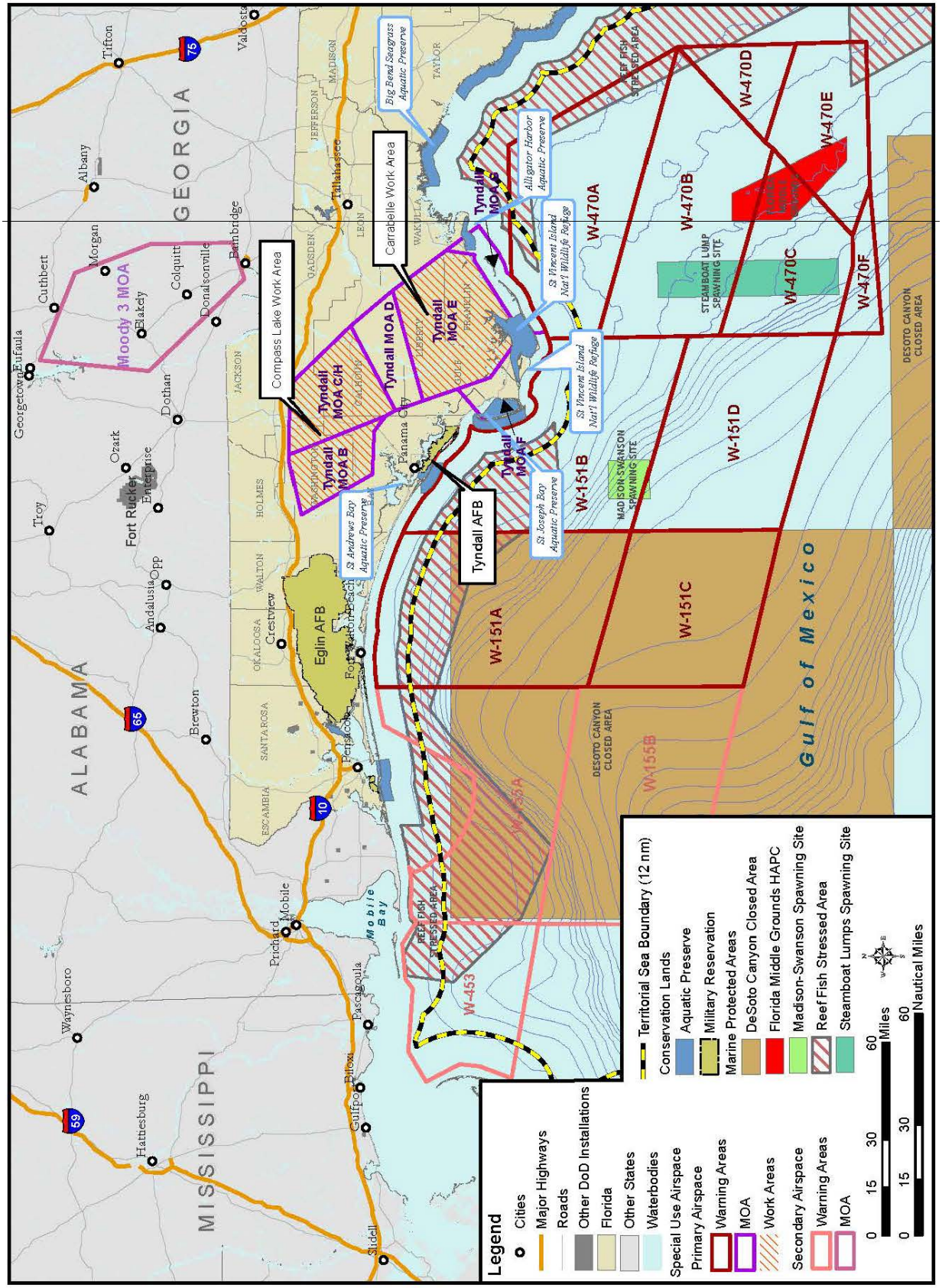

Figure 3–6. Special Biological Resource Areas

Birds – A variety of resident and migratory coastal and marine birds are associated with coastal and offshore areas of the Gulf of Mexico. These species may be categorized as diving birds, gulls/terns, shorebirds, passerines, and wading birds (Table 3–17). Some of the species are pelagic (open ocean) species and therefore are rarely sighted near land. The MBTA protects 836 migratory bird species, 58 of which are currently legally hunted as game birds. Figure 3–7 shows migratory pathways for numerous bird species using the Gulf of Mexico.

Table 3–17. Bird Species of the Gulf of Mexico

Diving Birds	Gulls/Terns	Shorebirds	Passerines	Wading Birds
Common loon	Gulls	Jacanas	Blue jay	American bittern
Horned grebe	Terns	Oystercatchers	Red-winged	Least bittern
Pied-billed	Noddies	Stilts	blackbird	Great blue heron
grebe	Jaegers	Avocets	Common	Great egret
Anhinga	Black skimmers	Snipes	grackle	Snowy egret
Double-crested cormorant		Allies	Northern	Little blue heron
Ganats		Upland sandpiper	cardinal	Tricolored heron
Boobies		White-rumped sandpiper	Eastern	Cattle egret
Petrels		Dunlin	towhee	Black-crowned night heron
Shearwaters		Semipalmated sandpiper		White ibis
		Piping plover		
		Snowy plover		
		Black-bellied plover		
		Wilson's plover		
		Western sandpiper		

Source: MMS 2007 and USGS 2007

Diving birds typically consume fish and are able to actively search for and capture their prey underwater. These birds generally pursue prey by pushing themselves with their wings and/or feet. Gulls, terns, noddies, jaegers, and black skimmers predominantly consume fish and may pursue prey underwater, plunge dive, scoop, or pluck food from the water's surface. Shorebirds occur at coastlines and inland water margins and generally feed by inserting their bill into exposed substrate. Many shorebird species have strongly developed migratory behavior, with some species migrating from the high Arctic tundra to southern South America. Along the central Gulf of Mexico coast, 44 shorebird species have been recorded; of these, six nest in the area, while the remainder are wintering residents and/or staging migrants (MMS 2007). Passerine birds primarily migrate across the Gulf of Mexico each fall and spring. In addition, they are protected under the MBTA. Migratory resting areas exist near Tyndall AFB. Wading birds have long legs that allow them to forage by wading into shallow water, while the long bills and necks are used to probe under water or to make swift strokes to seize prey (MMS 2007). Most of the bird species mentioned above are visual predators and forage during the daylight hours. Birds listed as threatened, endangered, or as species of special concern are described in Section 3.6.2.3 of this EA.

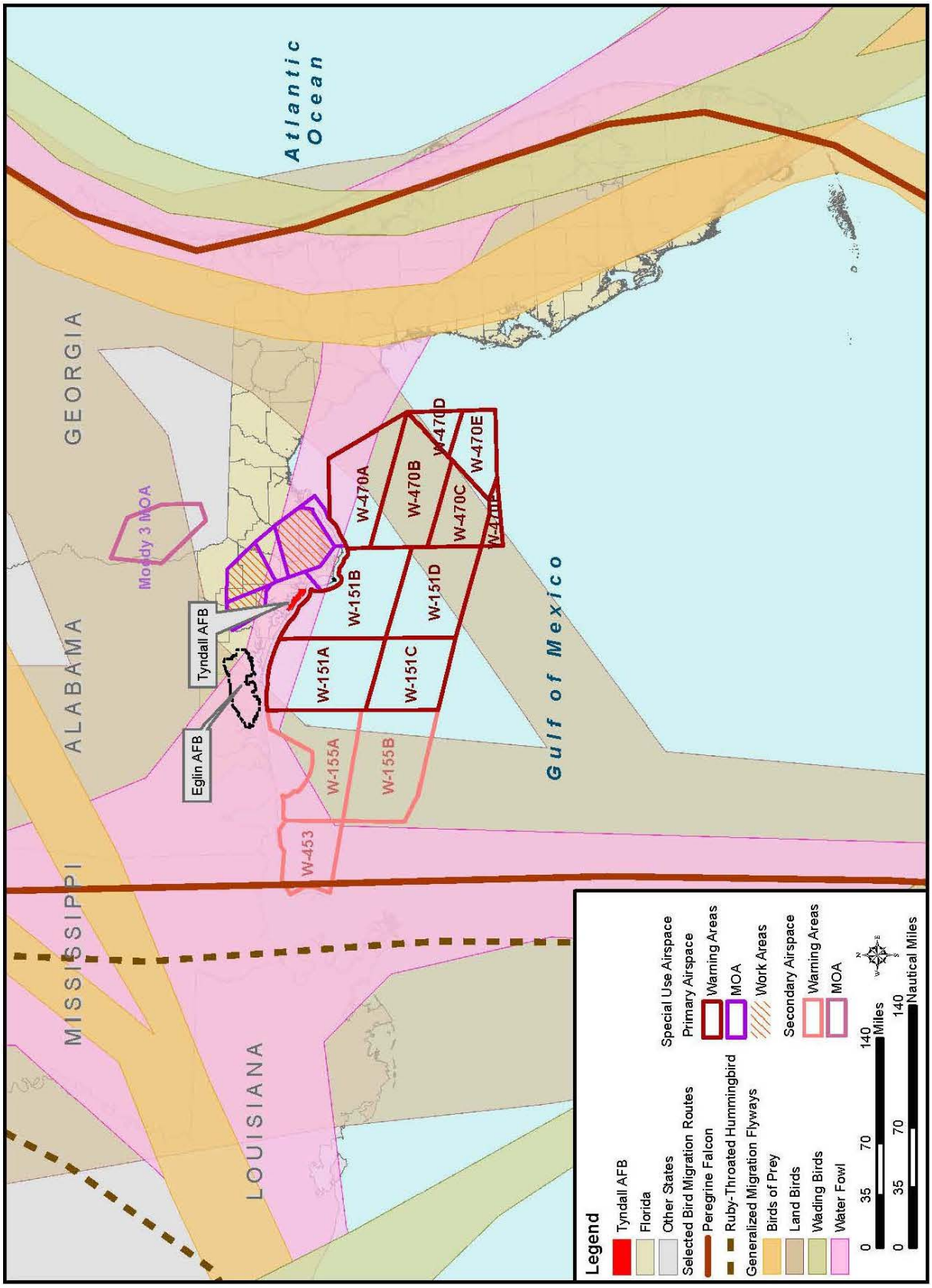

Figure 3–7. Migratory Bird Corridors

Fish and Essential Fish Habitat - Many species of marine fish occur near Tyndall AFB in the Gulf of Mexico and St. Andrews Bay. Marine fish occupy an important place in the marine food chain and function as prey for many other species including other fish, seabirds, and marine mammals. Marine fish may spend their entire lives in saltwater or may occur at times in freshwater or estuarine habitatsThe northeastern Gulf of Mexico provides a wide variety of habitats for marine fish to utilize, which are affected by the associated physical and chemical environment. Important environmental variables may include salinity, temperature, depth, bottom type, primary productivity, oxygen content, turbidity, and currents. Table 3–18 lists many of the more common fish of the eastern Gulf of Mexico grouped by water temperature preferences.

Table 3–18. Fish Common to the Northeastern Gulf of Mexico

Temperature Preference	Scientific Family Name	Common Name
Temperate 10ºC or below, with a maximum temperature tolerance of 15ºC	*Acipenseridae*	Sturgeons
	Atherinidae	Silversides
	Clupeidae	Herring, Menhaden
	Cyprinodontidae	Mummichogs, Killifish
	Engraulidae	Anchovies
	Exocoetidae	Flying Fish
	Percichthyidae	Striped Bass
	Pomatomidae	Bluefish
Subtropical Minimum water temperature between 10º to 20ºC	*Albulidae*	Bonefish
	Carangidae	Jacks
	Ephippidae	Spadefish
	Holocentridae	Squirrelfish
	Istiophoridae	Marlins
	Labridae	Wrasses
	Lutjanidae	Snappers
	Mullidae	Goatfish
	Scaridae	Parrotfish
	Sciaenidae	Drums
	Scombridae	Mackerel, Bonito, Tuna
	Serranidae	Groupers
	Sparidae	Porgies
	Xiphiidae	Swordfish
Tropical Temperature greater than 20ºC	*Centropomidae*	Snooks
	Chaetodontidae	Butterflyfish, Angelfish
	Coryphaenidae	Dolphinfish
	Elopidae	Tarpon
	Gerreidae	Mojarras
	Lutjanidae	Snappers
	Pomacentridae	Damselfish
	Pomadasyidae	Grunts
	Rachycentridae	Cobia
	Sciaenidae	Drums
	Sphymidae	Hammerhead Sharks
	Sphyraenidae	Barracudas

Source: DON 2009

Fish occurring in the Gulf of Mexico may be characterized according to their vertical preference in the water column. Benthic and reef fish occupy on the sea bottom and artificial or natural

reef systems. Typical fish species associated with bottom habitats include triggerfish, toadfish, flounder, stingrays, snappers, grunts, and groupers. Pelagic fish spend most of their lives in open waters and make seasonal migrations along the west coast of Florida. These migrations are linked to seasonal temperature changes, movement of their food resources, and spawning. Keppner (2002) documented 309 species of finfish (excludes shellfish) in the St. Andrews Bay estuary. Essential fish habitat has been identified for several fish species within the Gulf of Mexico. Table 3–19 provides details on the species and their habitat by life stage within the study area. Fish listed as threatened or endangered are described Section 3.6.2.3 of this EA.

Table 3–19. Essential Fish Habitat Identified in the Gulf of Mexico

Species	Life Stage	Habitat
Atlantic Sharpnose Shark	Neonate	Shallow areas; 0 to 5 m (0 to 16 ft)
Black Grouper	Adult, juveniles/subadults, larvae, eggs[sa]	Hardbottom; shore to 150 m (492.13 ft)
Blacknose Shark	Juvenile	Shallow estuaries; 0 to 5 m (0 to 16 ft)
Blacktip Shark	Neonate, juvenile	Shallow waters on seaward side of coastal islands; 0 to 5 m (0 to 16 ft)
Blue Marlin	Adult, juvenile/subadult	Pelagic; 100 to 2,000 m (328 to 6,562 ft) isobath
Bluefin Tuna	Adult	Pelagic; from 100 m (328 ft) isobath to the U.S. EEZ boundary
Bonnethead Shark	Neonate, juvenile, adult	Shallow coastal waters, inlets, and estuaries; 5 to 25 m (16 to 82 ft) deep
Brown Shrimp	Adult	Softbottom; estuarine dependent
Bull Shark	Neonate, juvenile, adult	Shallow coastal waters; 0 to 25 m (0 to 82 ft)
Cobia	Adult, juveniles/subadults, larvae, eggs[sa]	Pelagic; drifting or stationary floating objects
Corals	All life stages	Hardbottom
Sargassum	All life stages	Pelagic
Dolphin (Mahi)	Adult, juveniles/subadults, larvae, eggs[sa]	Pelagic; floating objects
Dusky Shark	Juvenile	Shallow coastal waters, inlets, and estuaries to the 500 m (1,640 ft) isobath
Finetooth Shark	Neonate, juvenile, adult	Shallow coastal waters to the 25 m (82 ft) isobath
Gag Grouper	Adult	Hardbottom
Greater Amberjack	Adult, juveniles/subadults, larvae, eggs[sa]	Pelagic and epibenthic; reefs and wrecks; to 400 m (1,312.34 ft)
Gray Snapper	Adult	All bottom types; 0 to 130 m (0 to 426.51 ft)
Gray Triggerfish	Adult	Hardbottom
King Mackerel	Adult	Pelagic
Lesser Amberjack	Adult, juveniles/subadults, larvae, eggs[sa]	Pelagic
Lane Snapper	Adult, juveniles/subadults, larvae, eggs[sa]	Soft and hardbottom; 0 to 130 m (0 to 426.51 ft)
Little Tunny	Adult, juveniles/subadults, larvae, eggs[sa]	Pelagic
Longfin Mako Shark	All life stages	Pelagic; 200 m (656 ft) isobath to U.S. EEZ
Oceanic Whitetip Shark	Juvenile	Pelagic; 200 m (656 ft) to the U.S. EEZ
Pink Shrimp	Adult[sa]	Soft, hardbottom; inshore to 65 m (213.26 ft)
Red Drum	Adult[sa]	Softbottom, oyster reefs, estuarine to 40 m (131.23 ft)
Red Grouper	Adult, juveniles/subadults, larvae, eggs[sa]	Hardbottom; 3 to 200 m (9.84 to 656.17 ft)
Red Snapper	Adult, juveniles/subadults, larvae, eggs[sa]	Hardbottom, pelagic
Sailfish	Adult, juvenile/subadult	Pelagic and coastal waters; 200 m to 2,000 m (656 to 6,562 ft) isobath; up to 50 m (164 ft) isobath near De Soto Canyon
Sandbar Shark	Adult, juvenile, neonate	Shallow coastal waters to the 90 m (295 ft) isobath
Scalloped Hammerhead Shark	Juvenile, neonate	Shallow coastal waters, coastal bays, estuaries; 5 m (16 ft) to the 200 m (656 ft) isobath

Species	Life Stage	Habitat
Scamp	Adult	Hardbottom
Silky Shark	Neonate	Pelagic, 200 to 2,000 m (656 to 6,562 ft) isobath
Skipjack Tuna	Spawning adult, egg, larvae	Offshore waters from 200 m (656 ft) isobath to the U.S. EEZ
Stone Crab	Adult[sa]	Soft, hard or vegetated bottom
Spiny Lobster	Adult	Hardbottom
Spanish Mackerel	Adult, juveniles/subadults, larvae, eggs[sa]	Pelagic; inshore to 200 m (656.17 ft)
Spinner Shark	Neonate	Shallow coastal bays; 0 to 5 m (0 to 16 ft)
Swordfish	Adult, spawning adult, egg, larvae	Pelagic; 200 to 2,000 m (656 to 6,562 ft) isobath
Tiger Shark	Adult, juvenile, neonateeonate	Shallow coastal waters to the 200 m (656 ft) isobath
Tilefish	Adult[sa]	Softbottom, steep slopes; 80 to 540 m (262.47 to 1,771.65 ft)
Vermillion Snapper	Adult, juveniles/subadults, larvae, eggs[sa]	Hardbottom; 20 to 200 m (65.6 to 656.17 ft)
White Marlin	Adult, juvenile	Pelagic; 200 to 2,000 m (656 to 6,562 ft) isobath and along 50 m (164 ft) isobath along De Soto Canyon
White Shrimp	Adult, juveniles/subadults, larvae, eggs[sa]	Softbottom; inshore to 40 m (131.23 ft)
Yellowfin Tuna	Adult, juvenile/subadult, larvae, eggs	Pelagic waters from the surface to 100 m (328 ft) deep and from 200 m (656 ft) isobath to the U.S. EEZ
Yellowtail Snapper	Adult, juveniles/subadults, larvae, eggs[sa]	Hardbottom; 0 to 180 m (0 to 590.55 ft)

Key:
EEZ = Exclusive Economic Zone ft = feet sa = spawning area
Source: DON 2009

Marine Mammals - Marine mammals potentially occurring in the northeastern Gulf of Mexico include 29 cetacean (whale and dolphin) species and one sirenian (the Florida manatee). Cetaceans may be grouped as odontocetes (toothed whales including dolphins) or mysticetes (baleen whales). Odontocetes use their teeth to capture prey, while mysticetes use baleen to filter small prey from the water column or substrate. Most cetaceans with regular occurrence in the study area are odontocetes. With the exception of Bryde's whale, baleen whales are considered extralimital or rare. Table 3–20 lists the species with expected occurrence and their estimated density in the study area. For all species other than the bottlenose dolphin, density estimates were derived from the *Navy OPAREA Density Estimates (NODE) for the GOMEX OPAREA* report (DON 2007). Densities were determined by either 1) model-derived estimates, or 2) Stock Assessment Report or other literature-derived estimates. Bottlenose dolphin density estimates are derived from Protected Species Habitat Modeling in the Eglin Gulf Test and Training Range (Garrison 2008). Density estimates provided in the NODE report are not corrected for negative bias and are therefore likely to underestimate density. To address potential negative bias, the estimate has been adjusted by use of submergence factors.

Table 3–20. Marine Mammals of the Northeastern Gulf of Mexico

Species	Density (animals/km²)	Dive Profile (% of time at surface)	Adjusted Density (animals/km²)
Bryde's Whale	0.000035	20	0.000175
Sperm Whale	0.000335	10	0.003345
Dwarf/Pygmy Sperm Whale	0.000381	20	0.001905
All Beaked Whales	0.000001	10	0.000013
Killer Whale	0.000117	30	0.000387
Pygmy Killer Whale	0.000357	30	0.001189
False killer Whale	0.000907	30	0.003023
Melon-Headed Whale	0.003015	30	0.010050
Short-Finned Pilot Whale	0.002087	30	0.006857
Rough-Toothed Dolphin	0.000389	30	0.001295

Species	Density (animals/km²)	Dive Profile (% of time at surface)	Adjusted Density (animals/km²)
Bottlenose Dolphin	0.631900	N/A*	0.631900
Risso's Dolphin	0.003632	30	0.012107
Atlantic Spotted Dolphin	0.105700	30	0.352333
Pantropical Spotted Dolphin	0.042870	30	0.142900
Striped Dolphin	0.009272	30	0.030907
Spinner Dolphin	0.038100	30	0.127000
Clymene Dolphin	0.015160	30	0.050533
Fraser's Dolphin	0.000634	30	0.002115
Totals	**0.854890**		**1.378034**

Source: DON 2007
Note: *Garrison (2008) provided an adjusted bottlenose dolphin density estimate, accounting for observer and availability bias

A resident population of bottlenose dolphins has been identified in St. Andrews Bay and nearby coastal Gulf waters off Tyndall AFB (Bouveroux and Mallefet 2010; Waring *et al*. 2002). The population occurs in all seasons and the population size is estimated at between 58 and 177 individuals (Bouveroux and Mallefet 2010). Scientists at the NMFS have determined that the coastal form of bottlenose dolphin constitutes a separate genetic stock within the bays and estuaries in which they occur. The inshore form possesses slightly different physical characteristics than the offshore variety. Bottlenose dolphins are the only cetacean species found in St. Andrews Bay. Marine mammals listed as threatened or endangered are described in Section 3.6.2.3 of this EA.

3.6.2.3 Threatened and Endangered Species

Several protected species of birds, reptiles, mammals, and fish occur in the coastal or marine environments of the study area that which are listed in Table 3–15. Species federally protected by the ESA are described below.

Birds - One federally listed bird species, the piping plover, occurs within the study area. Piping plovers inhabit coastal sandy beaches and mudflats. The wintering population of this species is listed as threatened along the Atlantic and Gulf coasts. The piping plover winters in the eastern Florida panhandle, including Bay County. Critical habitat has been designated for the piping plover, consisting of 137 coastal areas from North Carolina to Texas. The primary constituent elements for piping plover wintering habitat are those components essential for foraging, sheltering, roosting, and the physical features necessary for maintaining the natural processes that support these habitat components. These elements are found in coastal areas that support intertidal beaches and flats and associated dune systems and flats above annual high tide. In Florida, over 340 km of shoreline and over 11,000 hectares (ha) of land area are designated as critical wintering habitat. In Bay County, the Shell and Crooked islands are areas with critical habitat for piping plovers (Figure 3–8). The designated critical habitat consists of over 1,759 ha (6.8 square miles) located primarily in two areas: Tyndall AFB and the St. Andrews State Recreation Area.

Reptiles - Five sea turtle species potentially occur within the study area including the loggerhead, green, leatherback, Kemp's ridley, and hawksbill. The hawksbill is not common to the area and would only be expected during warm months. Loggerhead sea turtles regularly nest on the Gulf-side beaches of Tyndall AFB and leatherback nesting occurs to a lesser degree. There have been some instances of possible, though unconfirmed, Kemp's ridley nests. Juvenile

green sea turtles are known to occur in St. Andrews Bay during at least part of the year. General information on sea turtles is provided in Table 3–21. In addition, the American alligator is listed as threatened under the ESA due to similarity of appearance with the American crocodile.

Table 3–21. Sea Turtles in the Study Area

Species	Areas of Occurrence
Green Sea Turtle *Chelonia mydas*	Inhabits open water and hardbottoms of marine environment. Nests in the Gulf of Mexico from May to August and may occur within St. Andrews Bay.
Hawksbill Sea Turtle *Eretmochelys imbricata*	Open water. Does not nest or regularly occur within the study area.
Kemp's Ridley Sea Turtle *Lepidochelys kempi*	Smallest and most endangered of the sea turtles. Open water. Unconfirmed nesting in the study area.
Leatherback Sea Turtle *Dermochelys coriacea*	Inhabits open water and hardbottoms of marine environment. Nesting documented at Tyndall Air Force Base (AFB). May occur within St. Andrews Bay.
Loggerhead Sea Turtle *Caretta caretta*	Inhabits open water and hardbottoms of marine environment. Hatchlings often associated with S*argassum* rafts. Nests on northern beaches in the Gulf of Mexico from April to October, including Tyndall AFB. May occur within St. Andrews Bay.

Source: DON 2009

Marine Mammals - Two marine mammal species listed under the ESA may occur within the study area including the sperm whale and the Florida manatee. The sperm whale is the largest toothed whale species and is distributed from tropical to polar waters in all oceans. This species generally occurs beyond the continental shelf break, with sightings in the Gulf of Mexico consistently recorded in waters beyond the 200-m (656-ft) isobath. Overall, sperm whales may occur year-round in the deepest waters of the northern Gulf of Mexico and the outer continental shelf waters in the region off the Mississippi River Delta, which may represent a significant calving and nursery area for the species in the northern Gulf of Mexico. Based on genetic sampling, tagging studies, and other evidence, it is considered likely that a resident population of sperm whales exists in the Gulf of Mexico.

The Florida manatee occurs along both the Atlantic and Gulf coasts of Florida. Manatees are generally restricted to southern Florida during the winter, expanding their distribution northward in the summer. Industrial development has created warm-water refuges (e.g., power plant effluent plumes) that have enabled the manatee population to expand its winter range. Manatee sightings usually occur in warm freshwater, estuarine, and near shore coastal waters. Shallow grass beds with ready access to deep channels are preferred feeding areas in coastal and riverine habitats. Manatees occur in St. Andrews Bay during warm months, although their occurrence is not considered regular.

Fish - One fish species listed under the ESA, the Gulf sturgeon, occurs in the study area. Gulf sturgeon generally inhabit near shore marine and estuarine waters during cold months (approximately November to April), moving into freshwater rivers to spawn in the spring. Critical habitat has been designated for the Gulf sturgeon and is composed of 14 geographic areas or units. The units collectively encompass almost 2,800 kilometers (km) of river and over 6,000 km^2 of estuarine and marine habitat (Figure 3–8). Critical habitat is delineated along the Gulf of Mexico coastal waters adjacent to Tyndall AFB extending from the mean high water line to one mile offshore. The smalltooth sawfish historically occurred along the Florida panhandle. It is now uncommon in areas outside of southern peninsular Florida.

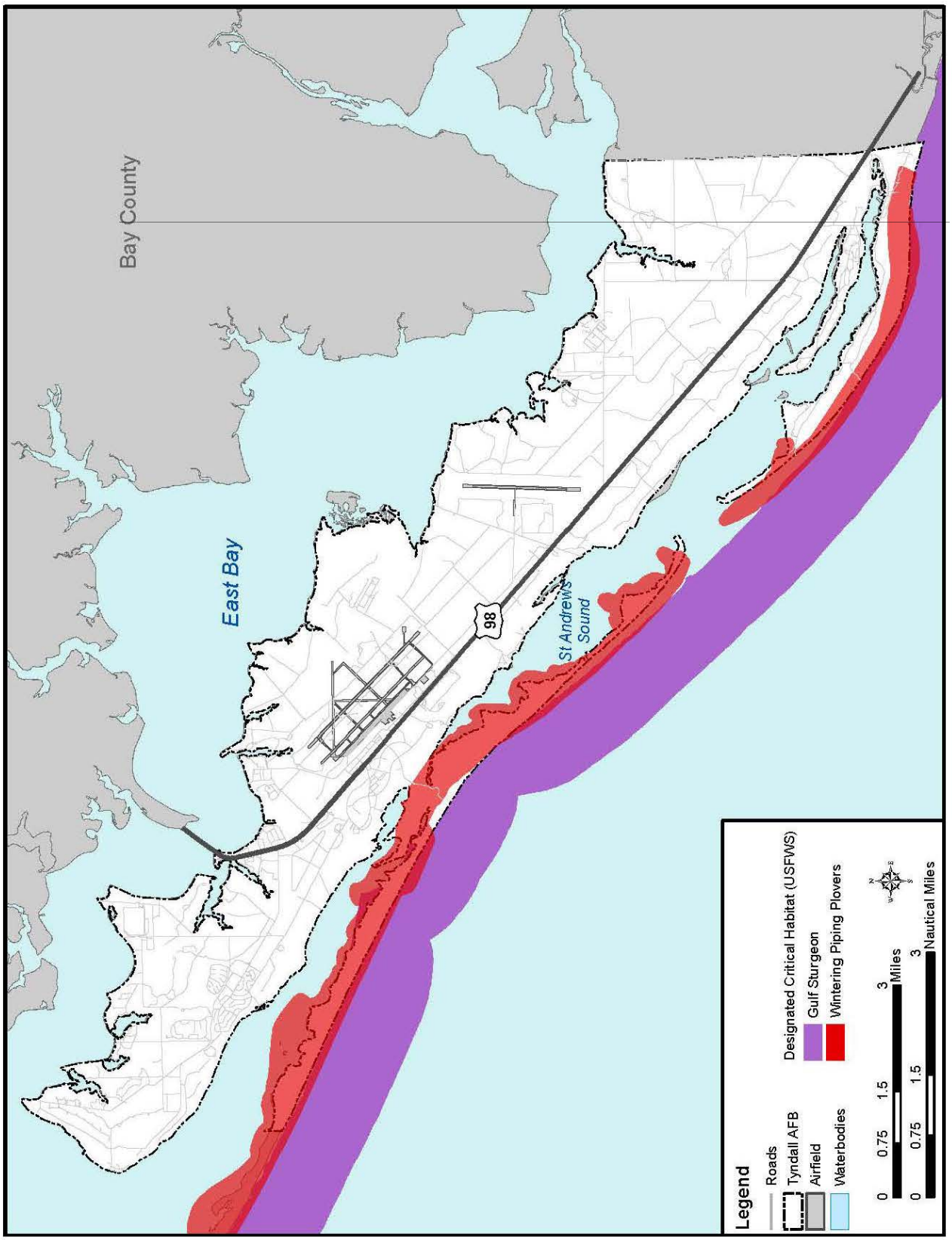

Figure 3–8. Designated Critical Habitat near Tyndall AFB

3.7 Cultural Resources

3.7.1 Resource Definition and Applicable Laws

As a federal agency, Tyndall AFB is required to consider the effects its actions may have on historic properties. These requirements are considered under AFI 32-7065 and the NHPA of 1966, as amended. The NHPA of 1966 sets federal policy for managing and protecting significant historic properties. Federal agencies must identify historic properties and consult with the Advisory Council on Historic Preservation and SHPO as necessary (AFI 32-7065). Section 106 of the NHPA specifically requires that federal agencies analyze the impacts of federal activities on cultural resources included in, or eligible for inclusion in, the NRHP.

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, and any other physical evidence of human activity considered relevant to a culture or community for scientific, traditional, religious, or other reasons. Cultural resources include archaeological resources (both prehistoric and historic), historic architectural resources, American Indian sacred sites, and traditional cultural properties. Historic properties (as defined in 36 CFR 60.4 and 36 CFR 800.15(l)(1)) are significant archaeological, architectural, or traditional resources that are defined as eligible for listing in the NRHP. Historic architectural resources include standing buildings and other structures of historic or aesthetic significance. Architectural resources generally must be more than 50 years old to be considered for inclusion in the NRHP, although resources dating to defined periods of historical significance, such as the Cold War era (1945 to 1989), may also be considered eligible.

Under NHPA, Tyndall AFB is required to consider the effects of its undertakings on historic properties listed or eligible for listing in the NRHP. NHPA obligations for a federal agency are independent from NEPA and must be complied with even when an environmental document is not required.

For the purpose of this EA, cultural resources, with a description of their state of investigation and condition, are presented for analysis as they intersect with the Area of Potential Effects (APE) created by the undertaking. As defined under 36 CFR 800.16(d), "the Area of Potential Effects is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The area of potential effects is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking." The APE for this project is assumed not to extend beyond the footprint of the project boundaries as defined under each alternative.

In 1999, the DoD published its American Indian and Alaska Native Policy, and in 2006 DoDI 4710.02, both of which emphasize the importance of respecting and consulting with tribal governments on a government-to-government basis. The policy requires that before decisions are made, an assessment be conducted through consultation of the effects of proposed DoD actions that may have the potential to affect protected tribal resources, tribal rights, and Indian lands significantly.

3.7.2 Affected Environment

Archaeological investigations of the area that is now Tyndall AFB began in 1902 with Clarence B. Moore's work on the Northern Gulf Coast. Since then, over a dozen surveys have been conducted to provide additional identification of archaeological and architectural resources at Tyndall AFB (Air Force 2010a). Due to previous work, 110 archaeological sites have been identified on Tyndall AFB. Of these 110 identified resources, 83 are prehistoric archaeological sites, 11 are historic archaeological sites, 15 are multi-component prehistoric/historic sites, and one is a non-cultural site (Air Force 2010a). The 110 archaeological sites include one non-NRHP eligible historic cemetery, 21 sites considered eligible for listing on the NRHP, six sites are considered potentially eligible for listing on the NRHP and 82 sites considered ineligible for the NRHP that require no additional consideration (Air Force 2010a).

Within the Proposed project area, an archaeological survey was conducted near and in the footprint of the proposed egress road from the Big Ammo facility. Eleven shovel tests were excavated with no cultural resources recovered (Dengel 2011a). In addition, no archaeological sites are located within the current APE. The most proximal archaeological site to any of the proposed activities is site 8BY01386, a prehistoric shell midden (Dengel 2011b) considered potentially eligible to the NRHP. This site is located over 1,000 feet away from any Proposed Actions and as such is outside of the current APE.

Three historic buildings, previously evaluated as eligible to the NRHP are present on Tyndall AFB. These structures include: Building 156, a World War II (WWII) hangar; Building 703, the base chapel; and Building 1003, the post office (Air Force 2010a). Only one of these buildings (Building 156) is within the current APE. Building 156 or Hangar #3, the only WWII hangar on Tyndall AFB, is considered eligible to the NRHP under Criteria A and C (Air Force 2010a). SHPO concurrence with the Air Force determination of no adverse effect was received on June 14, 2011.

Four federally recognized Native American groups have received official notice of the Proposed Action and subsequent follow-up correspondence on June 21st and July 5th of 2011; they are the Miccosukee Tribe of Indians of Florida, Seminole Tribe of Florida, Poarch Band of Creek Indians of Alabama, and the Muscogee Creek Nation (O'Brien 2011). To date, no identification of traditional cultural properties or sacred sites has occurred on base. The cultural resources management program at Tyndall AFB recognizes that in the event such traditional cultural properties or sacred sites are identified during the consultation process, the Cultural Resource Management (CRM) program would collaborate with the tribe in the management and protection of such sites (Air Force 2010a).

No traditional cultural properties, sacred sites, or native villages are located within the proposed area of operations. Tribal land for the federally recognized Native American groups includes land in Oklahoma; Mississippi; Ardmore, Alabama; and Hollywood and Miami, Florida, all of which are well outside proposed training areas. Other cultural resources present under the overland training airspace include archaeological and historic sites common to the region (Air Force 2010a). Architectural resources under the existing airspace include structures relating to WWII, the Cold War period, and historic period resources related to the Naval Stores industry. Prehistoric Native American subsurface deposits representing thousands of years of

continuous occupation are also found throughout this region (Air Force 2010a). In addition to NRHP-listed sites, there are likely to be additional cultural resources that are either eligible or potentially eligible for NRHP listing under the airspace.

3.8 Land Use

3.8.1 Resource Definition and Applicable Laws

Land use generally refers to human modification of land, often for residential or economic purposes. It also refers to use of land for preservation or protection of natural resources such as wildlife habitat, vegetation, unique features, or for recreational pursuits. The attributes of land use include general land use and ownership, special use land areas, and land management plans. Land uses are frequently regulated by management plans, policies, ordinances, and environmentally sensitive uses. General land use patterns characterize the types of uses within agricultural, military, and recreational. Similar groups of activities are grouped into the identified land uses. Management areas for special use land require greater protection (e.g., wild and scenic rivers, wilderness areas). As a means to facilitate the planning process, land is typically categorized into multiple, basic, land use categories. At a typical Air Force base, these categories generally include airfield pavements, aircraft Operations and Maintenance (O&M), industrial, administrative, community support, medical, unaccompanied and accompanied housing, outdoor recreation, and open space.

Several Florida regulations govern land use and compatible zoning. Florida Statute 163.3175 requires counties with military installations to coordinate with installations on future land use plans or changes in land use regulations to prevent incompatible development near the installation. Military installations are asked to provide local counties with information on change in noise levels or land use planning through programs such as AICUZ (Air Force 2008a).

The AICUZ program was developed by DoD to promote compatible land use development in areas subjected to military aircraft noise and accident potential. The guidelines recommend land uses compatible with airfield operations while allowing for the maximum beneficial use of adjacent properties. These guidelines are based on the guidelines published by the Federal Interagency Committee on Urban Noise (FICUN) in the June 1980 publication *Guidelines Considering Noise in Land-Use Planning and Control* and the U.S. Department of Transportation publication *Standard Land Use Coding Manual* (SLUCM) to identify and code land use categories. More information on these guidelines and land use categories is discussed in Appendix B.

The Coastal Zone Management Act (CZMA) was enacted to develop a national coastal management program that comprehensively manages and balances the impact of competing uses of land and the impacts of those uses to a coastal use or resource. The CZMA federal consistency requirement, CZMA Section 307, mandates that federal agency activities be consistent to the maximum extent practicable with the enforceable policies of a state management program. The federal consistency requirement applies when any federal activity, regardless of location, affects any land or water use or natural resource of the coastal zone. The question of whether a specific federal agency activity may affect any natural resource, land use, or water use in the coastal zone is determined by the agency implementing the action. Federal agencies make determinations as to whether their actions are consistent with approved state

plans and submit these determinations for state agency review and concurrence. All relevant state agencies must review the Proposed Action and alternatives and issue a consistency determination. The Coastal Zone Consistency Determination for the Proposed Action and Alternative 1 is included in Appendix C.

In addition to the federal regulations, due to its location on the coast, projects implemented on Tyndall AFB are subject to the Florida Coastal Zone Protection Act administered by the FDEP. The act regulates construction 1,500 feet landward of the Coastal Construction Control Line (CCCL), which is the area referred to as the coastal building zone. FDEP jurisdiction over coastal construction without an established CCCL extends 50 feet landward of the mean high water line on Atlantic or Gulf sandy shorelines per Florida Statute 161.052. Low energy mangrove or marsh shorelines are not included within this jurisdiction. In addition, per subparagraph 62B-33.004(3)(b), Florida Administrative Code, activities on lands owned and maintained by the U.S. government are exempt from Chapter 161 coastal construction regulations of the state of Florida.

The project area also includes areas that meet the definition of a floodplain. Development in a floodplain is guided by EO 11988, *Floodplain Management*, which requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, federal agencies shall take action to reduce the risk of flood loss; to minimize the impacts of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains.

3.8.2 Affected Environment

Tyndall AFB is comprised of 29,102 acres located on a peninsula in southeast Bay County (Hester 2011). The peninsula is 18 miles long and three miles wide. It is bordered on the northwest by St. Andrews Sound across from Panama City. The nearest community is the City of Parker located along Highway 98 on the opposite side of the DuPont Bridge from Tyndall AFB. Highway 98 bisects the base into the flightline side and the support side. The flightline side includes the runways and flight infrastructure such as the fuels depot, aircraft hangars and parking, and the maintenance shop. The support side includes the base commissary, base exchange, wing headquarters, Tyndall Elementary School, and privatized military family housing.

In 2004, Tyndall AFB updated the General Plan for the base and inventoried existing land uses. From this inventory, it was determined that over 60 percent of the installation is open space while only 8 to 9 percent is categorized as airfield, industrial, or recreational uses (Tyndall AFB 2004). Table 3–22 lists the land use categories with the acreage and share of total base acreage not including six off base communications sites.

Table 3–22. Tyndall AFB Existing Land Use, 2004

Land Use Category	Area (Acres)	Percent of Total Land Area
Administrative	111.7	0.4
Airfield	2,529.6	8.9
Aircraft Operations and Maintenance (O&M)	152.5	0.5
Community Commercial	78.6	0.3
Housing Accompanied	404.0	1.4
Housing Unaccompanied	73.0	0.3
Industrial	2,533.3	8.9
Medical	26.5	0.1
Open Space	19,414.7	68.2
Outdoor Recreation	2,176.5	7.6
Training	904.0	3.2
Total	**28,460.1**	**100**

Source: Tyndall AFB 2004

The coastal border (islands and main peninsula) and the east-southeast portion of Tyndall AFB are located within Federal Emergency Management Agency (FEMA) 100-year floodplains. The floodplain area along the coastline is continuous and can extend up to 4,000 feet inland, following bayous and low-lying areas. Barrier island areas south of St. Andrews Bay and sound are largely within the 100-year floodplain. The floodplain area located on the east-southeastern portion of the installation extends from the perimeter of the base three miles to the west and three quarters of a mile west of Farmdale Bayou (Tyndall AFB 2009b). Much of the area to northeast of the runway is in the 100-year floodplain as well. Areas of the base delineated as 100-year floodplains are shown in Figure 3–5 in Section 3.5.

During tropical storms and hurricanes, Tyndall AFB is also subject to tidal surges not directly associated with 100-year floodplains. Much of the low-lying coastal portions of the base and areas directly to the northeast of the runway area would be subject to tidal surges and subsequent flooding during a Category 2 hurricane (Tyndall AFB 2006). The MSA is included in a storm surge area for a Category 3 hurricane.

Highway 98 bisects Tyndall AFB and is the primary artery for access to Tyndall AFB. Tyndall AFB has nine gates of which only three gates are open every day and one gate is the commercial gate (Tyndall AFB 2004). The Tyndall Gate provides primary access to the flightline side of the base and the Sabre and Illinois gates provide access to the support side of the base including on-base housing. The road network on the flightline side of the base is a grid system with Florida Avenue and Tyndall Drive serving as the main roadways. Areas of minor congestion exists at the Tyndall Gate during peak morning hours as well as the intersection of Florida Avenue and Tyndall Drive during peak afternoon hours (Tyndall AFB 2004). There is also a large volume of traffic between the Tyndall Gate and the Illinois Gate as base personnel travel from one side of the base to the other. On the supply side of the base, the road network is a loop system around the community center area with internal connections and a radial road serving the Sabre Gate and on-base residential areas. The primary roads on the supply side of the base include Illinois Avenue, Beacon Beach Road, Sabre Drive, Mississippi Road, and Suwannee Avenue.

Tyndall AFB provides several opportunities for outdoor recreation on base as well as other opportunities in the surrounding area. There are nine fishing lakes and three hiking trails as well as hunting opportunities. Approximately 14,500 acres on Tyndall AFB have been

categorized as a Type II Wildlife Management Area (WMA) by the Florida Fish and Wildlife Conservation Commission (Tyndall AFB 2004). In Type II WMAs, public recreation and hunting is operated by the landowner in cooperation with the Commission. Nearby St. Andrews State Park also provides outdoor recreation opportunities including boating, hiking, camping, fishing, swimming, scuba diving, and snorkeling. The park is located north of Tyndall AFB on 700 acres approximately three miles east of Panama City.

Tyndall AFB completed an AICUZ study in 2008 and published a final report and Citizen's Brochure analyzing noise levels generated by airfield operations conducted between 2006 and 2007 (Air Force 2008b). These airfield operations include the F-22 training squadron, some of the F-15 squadrons, and the other aircraft currently stationed at Tyndall AFB. The resulting noise contours are discussed in detail as baseline conditions in Section 3.2. The 2008 AICUZ identified the land use categories affected by baseline noise levels. The cities of Parker and Callaway and unincorporated areas of Bay County are affected by noise levels 65 dB L_{dn} and greater. Excluding areas of water, approximately 828 acres and 593 people that are located off base are affected by these noise levels. The areas affected by these noise levels are categorized as residential, low-density residential, open space, and commercial (Tyndall AFB 2008a).

Bay County is located on the coast of the Gulf of Mexico south of the Florida panhandle. Major cities within Bay County include Panama City, Panama City Beach as well as the smaller communities of Parker, Callaway, Springfield, and Mexico Beach. The cities of Parker and Callaway are located nearest Tyndall AFB across from East Bay with access provided by Highway 98. According to the Parker Comprehensive Plan adopted in 1999, land use in Parker is characterized by low density residential, commercial, and mixed use development (City of Parker 1999). Land use in the City of Callaway is characterized as low and high-density residential, conservation, and commercial (City of Callaway 2010). Portions of southern Panama City are also near Tyndall AFB. The portions nearest to Tyndall AFB are categorized as various densities of residential, mixed use, heavy industrial, recreation, and public/institutional (City of Panama City 2009).

The primary airspace to be used by the F-22 operational squadron and the T-38 detachment include the Tyndall MOAs and the offshore warning areas. Secondary airspace, including the Moody 3 MOA, would be used infrequently so the F-22s and T-38s would be considered transient users; therefore, potential impacts to land use are only assessed for the areas below the Tyndall MOAs. Counties beneath the Tyndall MOAs include Bay, Calhoun, Franklin, Gulf, Jackson, Liberty, and Washington. These counties are characterized as rural communities with a few large communities. Table 3–23 shows the estimated 2009 population and the estimated population density of each county under the Tyndall MOAs. The estimated population and population density for Bay County and the state of Florida are also provided for comparison.

Table 3–23. Population and Population Density for Counties under the Tyndall MOAs

County	Land Area (square miles)	Census 2010	Estimated Population Density (persons per square mile)
Calhoun	567.31	14,625	26
Franklin	544.34	11,549	21
Gulf	554.6	15,863	29
Jackson	915.64	49,746	54
Liberty	835.87	8,365	10
Washington	579.93	24,896	43
Bay	763.68	168,852	221
Florida	53,926.82	18,801,310	349

Source: Census 2010d

There are several special land use areas (state parks, NFs, and NWRs) under or near the Tyndall MOAs. Table 3–24 lists these areas with the airspace unit and the baseline noise level within the airspace unit.

Table 3–24. Special Land Use Areas and Noise Levels under the Tyndall MOAs

Special Land Use Area	Acreage	Airspace Unit
Dr. Julian G Bruce St. George Island State Park, Street George Island, Florida	2,023	Tyndall MOA G
Falling Waters State Park, Chipley, Florida	173	Tyndall MOA B/Compass Lake Work Area
Florida Caverns State Park, Marianna, Florida	1,300	Tyndall MOA B/C/H/Compass Lake Work Area
St. Joseph Peninsula State Park, Apalachicola, Florida	2,516	Tyndall MOA F
Torreya State Park, Bristol, Florida	12,000	Tyndall MOA C/H/Compass Lake Work Area
Apalachicola NF, Liberty County, Florida	571,088	Tyndall MOA D/E/Carrabelle Work Area
Ochlockonee River State Park, Sopchoppy, Florida	543	Tyndall MOA E/Carrabelle Work Area
Bald Point State Park, Alligator Park, Florida	4,800	Tyndall MOA E/Carrabelle Work Area
Mud Swamp New River Wilderness, Apalachicola NF	8,090	Tyndall MOA E/Carrabelle Work Area
Bradwell Bay Wilderness, Apalachicola NF	24,602	Tyndall MOA E/Carrabelle Work Area
St. Vincent NWR, Apalachicola, Florida	12,490	Tyndall MOA E/Carrabelle Work Area

Key:
MOA = Military Operations Area NWR = National Wildlife Refuge NF = National Forest

Sources: Florida State Parks 2011a, 2011b, 2011c, 2011d, and 2011e; Tidewater-Florida.com 2011a, 2011b, and 2011c; Walton Outdoors 2011; USDA 2011; USFWS 2011b.

3.9 Socioeconomics

3.9.1 Resource Definition and Applicable Laws

Socioeconomic resources are defined as the basic attributes associated with human activities. The beddown of an operational F-22 squadron and a T-38 detachment would involve construction, renovation, and an influx of personnel to Tyndall AFB. Therefore, population, economic activity (employment and earnings), schools, and housing are addressed under socioeconomics as the indicators that could potentially be impacted by the beddown:.

Socioeconomics does not have an applicable regulatory setting and NEPA provides no specific thresholds of significance for socioeconomic impact assessment. Significance varies, depending on the setting of the Proposed Action (40 CFR 1508.27[a]), but 40 CFR 1508.8 states that indirect effects may include those that are growth-inducing and others related to inducing changes in the pattern of land use, population density, or growth rate.

3.9.2 Affected Environment

Population - In 2010, the total population in the ROI was estimated at 168,852 persons. In the State of Florida, the population reached an estimated 18,801,310 persons in the same year. Between 2000 and 2010, the population in the ROI increased at an average annual rate of 1.31 percent. The population increase for the state of Florida was slightly higher but comparable to the ROI with an average annual growth rate of 1.64 percent (Table 3–25).

Table 3–25. Population Growth, 2000-2010

Region	Year		Average Annual Change 2000-2010
	2000	2010	
Bay County (ROI)	148,217	168,852	1.31%
Florida	15,982,378	18,801,310	1.64%

Source: Census 2009a, Census 2010a

In FY10, 4,938 persons were assigned to Tyndall AFB. This included 4,341 active duty permanent personnel, 220 Air National Guard (ANG)/reserve, 69 traditional guard/reserve, and 308 military trainees. In addition, there were approximately 5,292 military dependents, 903 appropriated fund civilians, and 1,839 non-appropriated fund/contract/private business employees (Air Force 2010c). These personnel numbers do not reflect the recent drawdown of the F-15 fighter aircraft at Tyndall AFB from April to October 2010. The drawdown was part of an Air Force wide-ranging restructuring plan (The Star 2010) and an estimated 809 positions of Tyndall's workforce were lost due to the drawdown.

Economic Activity - In 2009 (the most recent data available), Bay County had a total employment of 97,616 jobs. The state of Florida had approximately 9.8 million jobs during the same period. Between 2001 and 2009, Bay County employment increased at an average annual rate of 1.86 percent. The state of Florida experienced a slower rate of growth than the county, with an increase of approximately 1.24 percent per year between 2001 and 2009 (Table 3–26).

Table 3–26. Employment Growth, 2001–2009

Region	Year		Average Annual Change 2001-2009
	2001	2009	
Bay County	84,255	97,616	1.86
Florida	8,917,152	9,840,243	1.24

Source: BEA 2011a

The largest source of employment in the ROI was the government and government enterprises industry that includes federal, military, state, and local government. The government and government enterprises industry accounts for approximately 18.9 percent of total employment. Other major industries in the ROI include retail trade (12.2 percent), and accommodations and food services (11.5 percent) (BEA 2011a).

In 2009, Bay County had a lower per capita income than the state of Florida. However, per capita income in the county increased at a faster rate than per capita income in the state, with an average annual increase of 4.53 percent between 2001 and 2009 compared to 3.40 percent for the state (Table 3–27).

Table 3–27. Per Capita Income, 2001–2009

Region	Year		Average Annual Change 2001-2009
	2001	2009	
Bay County	25,477	36,316	4.53%
Florida	29,809	38,965	3.40%

Source: BEA 2011b

Tyndall AFB is one of the region's largest employers and has a significant and positive impact on the surrounding area. In 2010, the total economic impact of Tyndall AFB in the local area was estimated at $653,967,292 (Air Force 2010c). This economic impact included over $372 million in payroll, $192 million in expenditures, and $89 million in value of jobs created from base related activities (Air Force 2010c). The estimates used in the calculation of the total economic impact incorporated the two F-15 squadrons and their support personnel into the overall analysis. Currently, there are no estimates available of the total economic impact associated with the F-15 fighter aircraft drawdown.

Housing - Housing in the ROI is primarily centered in Bay County. As of 2010, the total number of housing units in Bay County was 99,650 units, which represents an increase of 27 percent since the 2000 estimates. Approximately 68,438 (69 percent) of the total housing units were occupied and 31,212 (31.3 percent) units were vacant (Census 2000, 2010a).

In 2009, the five-year estimated median value of an owner occupied home in Bay County was $178,100 (Census 2009a). During May 2010, the median price per square foot for resale of a single-family home was $88; a decrease of 27 percent from July 2006 levels (HAAS Center 2010). Due to the decreases in mortgage interest rates and median home prices, housing affordability has increased in the area.

There are 867 privatized family-housing units for officers and enlisted personnel at Tyndall AFB, which include 174 two-bedrooms, 518 three-bedrooms, and 175 four-bedrooms (Air Force 2010c). In addition, there are 55 dormitory quarters with a bed capacity of 1,355 to provide accommodations for airmen/Non-Commissioned Officers (NCOs), technical training, visiting airmen, visiting officers, and temporary lodging facilities (Air Force 2010c).

Schools - The Bay County district school system serves the ROI and consists of 19 elementary schools (grades K-5), five middle schools (grades 6-8), six high schools (grades 9-12), one adult education school, and one special purpose school (BDS 2011a). Bay County district schools have more than 5,806 employees and 163 National Board Certified Teachers (NBCT) (BDS 2011b). As of 5 December 2010, the Bay County district ranked as the 27th largest district in the state of Florida with 25,943 students enrolled in pre-kindergarten (PK) through 12th (FDOE 2011). Student enrollment for the 2010-2011 school term is shown in Table 3–28. Only one school (Tyndall Elementary) is located on Tyndall AFB. It is part of the Bay County district school system.

Table 3–28. PK-12 Student Enrollment by Grade, as of 5 Dec. 2010

District	Grade Level														
	PK	KG	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
Bay	874	2,119	2,103	1,909	1,979	1,953	1,958	1,981	1,917	1,962	1,958	1,787	1,829	1,614	25,943

Source: FDOE 2011

3.10 Environmental Justice

3.10.1 Resource Definition and Applicable Laws

Concern that certain disadvantaged communities may bear a disproportionate share of adverse health and environmental effects compared to the general population led to the enactment in 1994 of EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This EO directs federal agencies to address disproportionate environmental and human-health effects in minority and low-income communities. In addition, 32 CFR 989, *EIAP,* addresses the need for consideration of environmental justice issues in compliance with NEPA. EO 12898 applies to federal agencies that conduct activities that could substantially affect human health or the environment. The evaluation of environmental justice is designed to:

- Focus attention of federal agencies on the human health and environmental conditions in minority communities and low-income communities with the goal of achieving environmental justice.
- Foster nondiscrimination in federal programs that may substantially affect human health or the environment.
- Give minority and low-income communities greater opportunity for public participation in, and access to, public information on matters relating to human health and the environment.

The Environmental justice analysis also addresses the protection of children as required by EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* issued in 1997 to identify and address issues that affect the protection of children. According to the EO, all federal agencies must assign a high priority to address health and safety risks to children, to coordinate research priorities on children's health, and to ensure that their standards take into account special risks to children. The EO states "…'environmental health risks and safety risks' mean risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)."

3.10.2 Affected Environment

The ROI for the resources supporting environmental justice and protection of children is defined as the region in which there is the potential for adverse impacts from construction or from flight operations. This region includes the area potentially impacted by high noise levels. In accordance with the *Guide for Environmental Justice Analysis with the Environmental Impact Analysis Process (EIAP)* (Air Force 1997), the ROI is compared to the community of comparison, which is defined as Bay County.

The analysis of environmental justice for the base and vicinity considers changes in airfield noise levels created by F-22 and T-38 training activities. Using 2010 Census data (where available) and noise contours from the 2008 AICUZ (the latest noise contours that were publicly available), the number of persons affected by off-base noise from Tyndall AFB was estimated. Baseline noise levels affect an estimated 594 persons with noise levels greater than 65 dB L_{dn}. Of these, approximately 23.0 percent are minority and 10.07 percent are low-income. As the

community of comparison required from the environmental justice analysis, Table 3–29 identifies total population and percentage of populations of concern in Bay County, the state of Florida, and the U.S.

Table 3–29. Total Population and Populations of Concern, Year 2010*

Region	Total Population	Percent Minority	Percent Low-Income*	Percent Youth
Bay County	168,852	15.2	12.5	22.0
Florida	18,801,310	23.0	13.2	21.3
United States	308,745,538	25.4	13.5	24.0

Note: *2005-2009 American Community Survey 5-Year Estimates
Sources: Census 2009b, 2010a,

Minority persons represent a smaller proportion of the total population in the county than they represent in the state or nation. Minority persons account for 15.2 percent of the county total population, 23 percent in the state, and 25.4 percent in the nation. The percentage of persons with incomes below the poverty level was lower in Bay County than the state and nation while the percentage of children under 18 in Bay County was higher than the state but lower than the national average (Table 3–29). Tyndall Elementary is located on Tyndall AFB and is affected by noise levels of 80 dB L_{dn} under baseline conditions. Parker Elementary School is also in the vicinity and is affected by noise levels of 57 dB L_{dn} under baseline conditions.

Training Airspace Affected Environment – The ROI for environmental justice and protection of children under the airspace to be used by the F-22 and T-38 includes the counties or portions of the counties directly overflown by the identified training airspace. Using GIS analysis with the 2010 Census data (where available) at the tract level, the number of minority, low-income, and persons under the age of 18 under the primary use airspace was estimated. The information is provided in Table 3–30.

Table 3–30. Populations of Concern under the Primary Use Airspace

Airspace Unit	Counties Overflown	Affected Population (2010)	Minority	Percentage of Minority	Low-Income*	Percentage of Low-Income*	Youth	Percentage of Youth
Tyndall Military Operations Area (MOA) B	Walton	14,942	2,745	18.4%	2,263	15.2%	3,202	21.4%
	Washington							
	Bay							
Tyndall MOA C/H	Jackson	22,949	4,463	19.4%	3,942	17.2%	5,503	24.0%
	Calhoun							
	Bay							
	Liberty							
	Washington							
Tyndall MOA D	Liberty	8,684	2,526	29.1%	1,536	17.7%	1,896	21.8%
	Gulf							
	Calhoun							
Tyndall MOA E	Franklin	15,977	3,286	20.6%	2,555	16.0%	3,482	21.8%
	Gulf							
	Wakulla							
	Liberty							
Tyndall MOA F	Gulf	6,003	1,408	22.4%	969	16.1%	1,279	21.3%
	Franklin							
Tyndall MOA G	Franklin	2,121	457	21.6%	285	13.5%	320	15.1%

Note: *2005-2009 American Community Survey 5-Year Estimates
Source: Census 2010a, 2010b (Calculated using Geographic Information System [GIS])

As part of the environmental justice analysis, the minority, low-income, and youth populations are presented in Table 3–31 for the communities of concern that are represented by the counties and states in which the airspace resides.

Table 3–31. Communities of Comparison under the Tyndall MOAs, Year 2010

Region	Total Population	Percent Minority	Percent Low-Income*	Percent Youth
Bay County	168,852	15.2	12.5	22.0
Calhoun County	14,625	17.2	20.5	21.4
Franklin County	11,549	16.0	23.8	17.1
Gulf County	15,863	20.5	17.5	16.2
Jackson County	49,746	29.6	21.1	20.0
Liberty County	8,365	21.4	22.8	21.2
Wakulla County	30,776	16.5	13.1	22.5
Walton County	55,043	10.0	13.1	20.6
Washington County	24,896	17.9	21.0	21.2
Florida	18,801,310	23.0	13.2	21.3
United States	308,745,538	25.4	13.5	24.0

Note: * 2005-2009 American Community Survey (ACS) 5-Year Estimates.
Sources: Census 2009b, 2010a, 2010b, 2010c

3.11 Infrastructure

3.11.1 Resource Definition and Applicable Laws

Infrastructure assets at each installation include electrical, natural gas, potable water, wastewater, solid waste, and the storm drainage system.

3.11.1.1 Regulatory Setting

The primary laws and orders governing Air Force actions relative to infrastructure assets includes the Energy Policy Act of 2005, the Energy Independence and Security Act of 2007, and EO 13423 *Strengthening Federal Environmental, Energy, and Transportation Management* (2007), EO 13514, *Office of the Under Secretary Federal Leadership in Environmental, Energy, and Economic Performance* (October 2009). The legislative focus is to set goals for reducing use of energy and water and minimizing the generation of wastewater and solid materials. Goals are clearly defined as percentage reductions from a base year.

3.11.2 Affected Environment

3.11.2.1 Potable Water System

Tyndall AFB obtains its potable water supply from Bay County, Florida who sources its water supply from Dear Point Lake (Bay County 2011) located approximately 15 miles north of the base. Tyndall AFB also maintains two wells that are located on base for use in an emergency. The potable water supply used by the base is pumped across the DuPont Bridge to a 5 million gallon above ground storage tank. The tank and a booster pump station are operated by Bay County and located on land leased by the county from the Air Force. The water is pumped from the tank through a county-owned 16-inch pipeline onto Tyndall AFB (Tyndall AFB 2007a). The base taps into the pipeline at three locations along Highway 98. Water from the county pipeline is pumped into the base's water distribution system through pressure reducing valves

and into two above ground water storage tanks. The Bay County Water Treatment Plant uses a conventional treatment process consisting of coagulation, flocculation, sedimentation, filtration, pH adjustment, disinfection, fluoridation, and corrosion control (Tyndall AFB 2009a). The base does not treat the water supplied by the county, who maintains responsibility for the water quality (Tyndall AFB 2007a). In 2009, drinking water at Tyndall AFB did not exceed federal maximum contaminant levels for any measured contaminants (Tyndall AFB 2009a). The base uses the following two above ground storage tanks to provide emergency potable water storage capacity with a total capacity of approximately 400,000 gallons.

1. Facility 733 - Capacity of 250,000 gallons.
2. Facility 2892 - Capacity of 150,000 gallons.

In addition to the potable water supply, the base maintains three additional storage tanks (with pump stations) to meet fire suppression requirements for specific facilities. The three tanks have a total capacity of 791,000 gallons that is supplied by the water distribution system.

1. Tank 236 has a capacity of 500,000 gallons,
2. Tank 502 has a capacity of 246,000 gallons, and
3. Tank 9754 has a capacity of 35,000 gallons.

In addition to the water supplied by Bay County, Tyndall AFB can meet their emergency requirements with three wells located on the base that extracts water from the Florida Aquifer for use only in emergency conditions. The base has standby chlorine gas for use in disinfecting the well water if these emergency water sources are used (Tyndall AFB 2007a). The average water usage for FY11 was 846,280 gallons per day (309 million gallons per year).

3.11.2.2 Sanitary Sewer System

Tyndall AFB uses an existing gravity sewer system to handle the base wastewater flow. The sewer system consists of building sewers, laterals, mains, manholes, cleanouts, lift stations, oil water separators, grease traps, and septic tanks. Eight wastewater lift stations on the base are used to convey wastewater to the Bay County Advanced Wastewater Treatment Plant (AWWTP), which is an activated sludge, biological nutrient removal five-stage treatment facility (Bay County 2011). Tyndall AFB is allowed by permit to discharge a monthly average of up to 1.26 Million Gallons per Day (MGD) of wastewater to the Bay County AWWTP. The average discharge in FY11 was less than 0.9 MGD.

3.11.2.3 Stormwater Drainage System

Stormwater at Tyndall AFB is regulated under the Multi-Sector Generic Permit (MSGP) (Facility ID: FLR05C304) issued by the FDEP and the Industrial Sector "S" Air Transportation Facilities of the NPDES to operate facilities and discharge stormwater to surface waters. The base has developed and implemented an SWPPP to comply with the conditions of the permit and to serve as a guide to base personnel who are responsible for ensuring that there is minimal stormwater pollution due to activities on the base. The SWPPP is amended whenever there is a change in facility design, construction, operation, or maintenance that materially affects the potential for stormwater contamination at the facility. These amendments are implemented to

the maximum extent practical. More detail on the stormwater drainage system and outfall areas is provided in Section 3.5.

3.11.2.4 Solid Waste Management

Tyndall AFB does not operate an onsite solid waste facility (landfill), so it uses a contractor for refuse collection and non-hazardous solid waste disposal. Dumpsters are located throughout the base for collection of office wastes and inert industrial solid waste. All solid waste is collected and transported off site for disposal at one of two approved landfills: the Bay County Waste to Energy Facility and the Steelfield Road Landfill (Tyndall AFB 2010a). Tyndall AFB has developed and implemented an Integrated Solid Waste Management Plan (ISWM) to reduce the waste stream by reducing the amount of waste generated at the source and by reusing and recycling materials to reduce the amount of waste disposed of at a landfill (Tyndall AFB 2010a). Solid waste (including construction and demolition debris) disposal for FY08 was 2,723 tons.

3.11.2.5 Electrical System

The Gulf Coast Electric Cooperative (GCEC) supplies Tyndall AFB with electricity delivered via two 46-kilovolt (kV) lines to a electrical substation on the west end of the base, which steps the voltage down to 12.47-kV level for distribution within the base (Tyndall AFB 2007a). GCEC owns and operates the electrical distribution system within the base, which consists of approximately 159 wire miles of primary conductor with approximately 95 percent overhead and the remaining 5 percent in conduit (Tyndall AFB 2007a). Tyndall AFB consumed 98,315,020-kilowatt hours (kWh) in FY11.

3.11.2.6 Natural Gas System

Tyndall AFB purchases odorized natural gas from TECO Peoples Gas, which is delivered to the base through a utility-owned regulator station that reduces the pressure from 120 pounds per square inch gauge (psig) to 55 psig for distribution on the base. The bases' natural gas distribution system consists of approximately 14 miles of steel and polyethylene pipes (Tyndall AFB 2004). There is no storage of natural gas on base. Tyndall AFB's natural gas consumption for FY11 was 108,460 mcf (thousand cubic feet).

3.12 Hazardous Waste and Materials

3.12.1 Resource Definition and Applicable Laws

The terms "hazardous materials" and "hazardous waste" refer to substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (RCRA). In general, hazardous materials include substances that, due to their quantity, concentration, or physical, chemical, or infectious characteristic may present substantial danger to public health or the environment when released into the environment. Hazardous wastes that are regulated under RCRA are defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that either exhibit one or more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity, or are listed as a hazardous waste under 40 CFR Part 261. The Environmental Restoration Program (ERP) and

Installation Restoration Program (IRP) are DoD programs used to identify, characterize, and remediate contamination from past activities at DoD installations.

3.12.1.1 Regulatory Setting

Hazardous materials are identified and regulated under CERCLA, OSHA, and Emergency Planning and the Community Right-to-Know Act. Hazardous materials are defined in AFI 32-7086, *Hazardous Materials Management,* to include any substance with special characteristics that could harm people, plants, or animals. Waste may be classified as hazardous due to its toxicity, reactivity, ignitability, or corrosivity. In addition, certain types of waste are listed or identified as hazardous in 40 CFR Part 263.

3.12.2 Affected Environment

Hazardous materials used by Tyndall AFB are controlled through the Air Force Pollution Prevention Program Plan and Tyndall AFB Hazardous Waste Management Plan (HWMP) dated December 2010 (Tyndall AFB 2010b), which provide centralized management of the procurement, handling, storage, issuance, turn-in, recovery, reuse, or recycling of hazardous materials. Development of these plans included review and approval by Air Force personnel to ensure that users are aware of exposure and safety risks. Base developed management plans further serve to ensure compliance with applicable federal, state, and local regulations.

Aircraft flight O&M and installation maintenance requires storage and use of hazardous materials such as flammable and combustible liquids. These materials include acids, corrosives, caustics, glycols, compressed gases, aerosols, batteries, hydraulic fluids, solvents, paints, pesticides, herbicides, lubricants, fire retardants, photographic chemicals, alcohols, and sealants.

Tyndall AFB is a Large-Quantity hazardous waste Generator (LQG) (USEPA ID Number FL 1570024124) that generates more than 2,200 pounds of non-acute hazardous waste per month (Tyndall AFB 2010b). Hazardous wastes are generated from a variety of functions on base including aircraft and vehicle O&M, medical and dental facilities, cleaning and degreasing operations, and various maintenance and paint operations. These wastes include solvents, paints, paint-related materials, absorbent materials, rags and debris, blast materials, and materials with an expired shelf life. Tyndall AFB recycles all lubricating fluids, batteries, oil filters, and shop rags. Hazardous wastes generated are managed in accordance with the Tyndall AFB HWMP (Tyndall AFB 2010b). Initial Accumulation Point (IAP) managers are responsible for properly segregating, storing, characterizing, labeling, marking, packaging, and transferring all hazardous wastes for disposal from the IAP to the established 90-day storage area according to federal, state, local, and Air Force regulations. The Hazardous Waste Program Manager is responsible for characterizing and profiling each waste stream. Approximately 114 hazardous waste IAPs are located at Tyndall AFB.

Tyndall AFB has one less-than-90-day site (Building 6011) that allows the base to store hazardous waste for up to 90 days before transfer to the Defense Reutilization Market Office. The site is managed by 325 CES/CEANN. Hazardous wastes generated on base and not stored in an IAP must be characterized, profiled, and moved to the 90-day site the same day it is rendered as waste. Wastes generated on the base are managed in accordance with applicable regulations as set forth in Tyndall AFB's HWMP.

Existing storage tanks and capacity for JP-8 would be used for the Tyndall AFB sites that are currently operated under a Spill Prevention, Control, and Countermeasures Plan (SPCCP). Hazardous materials and wastes used and generated at Tyndall AFB are currently managed under existing management procedures and standard construction practices, which are sufficient to prevent any significant impact on the on-base environment or general public.

3.12.2.1 Environmental Restoration Program (ERP)

The DoD developed the ERP to identify, investigate, and remediate potentially hazardous material disposal sites that existed on DoD property prior to 1984. The Air Force initiated an IRP at Tyndall AFB in 1981. Investigation and cleanup activities have occurred under the requirements of CERCLA. The Military Munitions Response Program (MMRP) was established by Congress in 2001 under the ERP to address the issues of Unexploded Ordnance (UXO), Discarded Military Munitions (DMM), and Munitions Constituents (MC) on sites owned and operated by the DoD. There are currently 80 ERP sites at Tyndall AFB including 13 that are currently regulated under CERCLA, 31 petroleum cleanup sites, 11 MMRP sites, and 25 closed sites (Tyndall AFB 2010b). The Tyndall Site Management Plan (SMP) identifies the status of the IRP/ERP sites and the MMRP for the installation (Tyndall AFB 2009c). The purpose of the SMP is to outline the Tyndall AFB strategy and timeline for conducting a CERCLA investigation and remediation program for the base. AETC policy requires that any proposed project on or near a Tyndall AFB ERP site be coordinated through the Tyndall AFB ERP Manager and they must obtain construction waivers from AETC/CE or ACC/CE depending on the timing of the construction and the major command that Tyndall AFB reports to at that time.

3.12.2.2 Toxic Substances

Asbestos Containing Materials (ACMs) contain greater than 1 percent asbestos. Friable, finely divided, and powdered wastes containing greater than 1 percent asbestos are subject to regulation. A friable waste is one that can be reduced to a powder or dust under hand pressure when dry. Non-friable ACMs (floor tiles) are considered nonhazardous except during removal and/or renovation so they are not subject to regulation. Tyndall AFB has an Asbestos Management and Operations Plan (AMO) to provide guidance for identification and management of ACMs. Designs for the alteration of buildings and self-help projects are reviewed to determine if ACMs are present in the proposed work area. ACM wastes are removed by contractor and disposed of in accordance with federal and state regulations. 325 CES is responsible for the asbestos program on Tyndall AFB (Tyndall AFB 2003).

Lead-Based Paint (LBP) is surface paint that contains lead in excess of 1 milligram per square centimeter as measured by X-ray fluorescence spectrum analyzer or 0.5 percent lead by weight. Several structures have the potential to have LBP on building surfaces. Demolition and renovation of facilities with LBP requires special procedures and disposal. In 1993, OSHA (29 CFR, Part 1926) restricted the permissible exposure limit for general industrial workers to 50 micrograms per cubic centimeter of air including those working construction. On Tyndall AFB, the 325 CES is responsible for the base hazardous waste program that includes compliance surveys and training for base personnel involved in the management of hazardous waste, including LBP (Tyndall AFB 2010b).

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4 ENVIRONMENTAL CONSEQUENCES

4.1 Airspace Management and Use

The 325 FW would continue to use the same MOAs, warning areas, and associated ATCAAs that are described in Section 3.1. None of the proposals would create new airspace or change the lateral boundaries of any existing military training airspace; therefore, this analysis focuses on levels of activity to ensure that airspace capacities and ATC management capabilities are not exceeded.

4.1.1 Methodology for Analysis

The potential effects of the Proposed Action and alternatives on the regional ATC environment are assessed by considering the changes in aircraft operations and airspace uses that could occur relative to current conditions under each, particularly in relation to the capacity and scheduling of the airspace units. If required, measures that could minimize potential impacts on air traffic and ATC systems were considered. Potentially significant impacts could occur if air traffic in the region and/or the ATC systems were encumbered by changed flight activities associated with any of the alternative actions.

4.1.2 Proposed Action

The Proposed Action to beddown 21 F-22s and 20 T-38 aircraft assumes the F-22 and T-38 aircraft would utilize the same airspace the majority of the time when they are flying together. The F-22s would conduct some training operations without being accompanied by T-38s; therefore, the F-22s would have a greater demand on the regional airspace than the T-38s. The additional F-22 and T-38 aircraft would create additional airfield ATC operations over current traffic count, but it is not anticipated to go above the levels that Tyndall AFB has accommodated in the recent past.

The F-22 and T-38 aircraft would use the same SUA as the current Tyndall AFB aircraft. The primary airspace (particularly the warning areas) is scheduled by Eglin AFB, which would be used by the Eglin-based F-35s once they arrive (Air Force 2009). Table 2-6 shows the number of sortie-operations proposed in the primary airspace by the F-22 operational squadron and the T-38 detachment. The total use of the Tyndall MOAs and W-470 would decrease by approximately 8 percent as compared to baseline conditions. Use of the Carrabelle and Compass Lake Work Areas would increase by over 92 percent and 44 percent, respectively. Use of W-151 would increase by nearly 37 percent. Tyndall AFB has scheduling authority and therefore, priority for the use of the Tyndall MOAs, Carrabelle, and the Compass Lake Work Areas. It is expected that Tyndall AFB would schedule these airspace units to the extent required to meet the 325 FW training requirements for the F-22 operational squadron, the T-38 detachment, and other 325 FW users. The greater use of the warning areas controlled by Eglin AFB by the F-22 operational squadron and the T-38 detachment would increase the demand and compete with the new F-35s at Eglin AFB. Coordinated scheduling between 325 FW and 46 TW at Eglin AFB would ensure demand for the warning areas would not exceed capacity to the extent possible and no significant impacts would be anticipated.

4.1.3 Alternative 1

The Alternative 1 action to beddown 21 F-22 and 10 T-38 aircraft assumes that the F-22 and T-38 aircraft would utilize the same airspace for the majority of the time they are flying together. The additional F-22 and T-38 aircraft would generate added airfield ATC operations over the current traffic count, but the number of operation is not anticipated to go above the levels that Tyndall AFB has accommodated in the recent past.

It is anticipated that the F-22 and T-38 aircraft would use the same SUA as the current Tyndall AFB aircraft as well as the new F-35s from Eglin AFB therefore the demand would remain similar to the Proposed Action. Table 2-6 shows the number of sortie-operations proposed in the primary airspace by the F-22 operational squadron and the T-38 detachment. The total use of the Tyndall MOAs and W-470 would decrease by approximately 12 percent and 16 percent, respectively, as compared to baseline conditions. Use of the Carrabelle and Compass Lake Work Areas would increase by over 63 percent and 26 percent, respectively. Use of W-151 would increase by nearly 19 percent. It is expected that Tyndall AFB would schedule these airspace units to the extent required to meet the 325 FW training requirements for the F-22 operational squadron, the T-38 detachment, and other 325 FW users. Coordinated scheduling between 325 FW and 46 TW at Eglin AFB would ensure demand for the warning areas and the Tyndall MOAs would not exceed their capacity to the extent possible. No significant impacts would be anticipated.

4.1.4 No Action Alternative

Under the No Action Alternative, no additional F-22 or T-38 aircraft would beddown at Tyndall AFB. The number of ATC operations would continue at current levels. The demand for SUA would remain unchanged over current levels.

4.2 Noise

4.2.1 Methodology for Analysis

In this section, noise associated with proposed aircraft operations and construction activities at Tyndall AFB is considered and compared with current conditions to assess impacts. Data developed during this process also supports analyses in other resource areas, such as Biological Resources, Cultural Resources, and Land Use.

Installation – Noise levels associated with proposed aircraft operations were calculated using NOISEMAP version 7 and plotted in 5 dB increments from 65 L_{dn} to 85 L_{dn}. Based on numerous sociological surveys and recommendations of federal interagency councils, the most common benchmark referred to when estimating the noise impact near airfields is 65 L_{dn}. This threshold is often used to determine residential land use compatibility around airports, highways, or other transportation corridors. Public annoyance is the most common impact associated with exposure to elevated noise levels. When subjected to L_{dn} of 65 dB, approximately 12 percent of persons so exposed would be "highly annoyed" by the noise. Acreage affected by noise contours was calculated using GIS software. The number of off-installation residents exposed to noise in each 5 dB L_{dn} increment was estimated using the most recent U.S. Census data at the

Census block level. When a noise contour line bisected a Census block, the estimated population was pro-rated based on the fraction of the Census block area within the noise contour line. Potential for speech interference is estimated based on the expected number of overflight events exceeding 50 dB L_{max} indoors. The probability of sleep disturbance was calculated using methodology described in ANSI) standard 12.9-2008.

As per a recent Undersecretary of Defense memorandum, populations exposed to noise levels exceeding 80 L_{dn} are at the greatest risk of PHL (UDATL 2009). The number of non-residential structures exposed to 80 L_{dn} or greater is calculated as a point of reference. As described in Section 3.2, the DoD Hearing Conservation Program protects workers in high-noise environments from hearing loss risk. Persons living in residential areas within the 80 L_{dn} noise contour require additional analysis to determine level of risk, which is conducted on a case-by-case basis.

Airspace – Subsonic noise levels beneath training airspace units (in L_{dnmr}) were calculated using the program MR_NMAP (Lucas and Calamia 1996). The relationship between L_{dnmr} and annoyance is roughly the same as the relationship between L_{dn} and annoyance and the same impact thresholds apply in prediction of annoyance near installations and under training airspace (Table 3–2).

Supersonic noise levels and the number of sonic booms experienced per month were calculated using the program BOOMAP. Annoyance associated with sonic booms relates to L_{cdn} in a manner that is similar to, but not the same as, the relationship between L_{dn} and population annoyance (Table 3–2). Overpressures associated with individual sonic booms were estimated using the program PCBOOM and compared against known physical impacts thresholds to determine impacts.

4.2.2 Proposed Action

Installation – F-22 training aircraft are based at Tyndall AFB currently and overflights of the operational F-22 aircraft would be approximately the same, in terms of noise generated by individual aircraft operations, as current F-22 operations. The T-38 is generally a quieter aircraft than the F-22, but would always take off using afterburner power while the F-22 would do so for no more than 10 percent of their takeoffs. In a typical takeoff configuration, T-38 overflight at 1,000 AGL in afterburner generates an SEL of 111. An F-22 overflight in afterburner at 1,000 AGL in a typical takeoff configuration generates an SEL of 121 dB and in military power generates an SEL of 119 dB.

Noise contours reflecting the Proposed Action are shown in Figure 4–1 Noise levels under the Proposed Action are compared against baseline conditions, which include operations of based F-15 aircraft. As discussed in Section 2.2.1, this baseline reflects the most representative operational tempo for Tyndall AFB. Comparing the noise levels under the Proposed Action to this baseline reflects the projected change in noise levels in the communities as compared to the noise levels the communities have experienced consistently over the last several years. An additional 1, 3, and 103 acres of land would be affected by noise levels greater than 65 L_{dn} in the City of Parker, Panama City, and Callaway, respectively (Table 4–1). In unincorporated portions of Bay County, the total area exposed to noise greater than 65 L_{dn} would decrease by

190 acres. The net total change in non-DoD owned land area affected by noise levels greater than 65 L_{dn} would decrease by 83 acres. On Tyndall AFB, an additional 1,396 acres would be affected by greater than 65 L_{dn} and an additional 7,389 acres of open water areas would be affected by greater than 65 L_{dn}. The estimated number of off-installation residents affected by noise greater than 65 L_{dn} would increase from 593 to 786. Persons exposed to increased noise levels would be more likely to become annoyed by the noise.

Table 4–1. Noise Exposures under the Proposed Action and Baseline

Location	Geographic Area (in acres) Exposed to Indicated Noise Levels in Day-Night Average Sound Levels (L_{dn})					
	65-70	70-75	75-80	80-85	>85	Total
Baseline Conditions						
Tyndall Air Force Base (AFB)	5,657	6,378	5,370	2,319	1,705	21,429
Open Water	28,192	10,910	2,140	368	0	41,610
City of Callaway	19	0	0	0	0	19
Panama City	0	0	0	0	0	0
City of Parker	103	37	0	0	0	140
Unincorporated Bay County	534	119	17	0	0	670
Total	**34,505**	**17,444**	**7,527**	**2,687**	**1,705**	**63,868**
Proposed Action						
Tyndall AFB	6,630	8,110	4,407	2,067	1,611	22,825
Open Water	36,255	10,283	2,233	228	0	48,999
City of Callaway	20	0	0	0	0	20
Panama City	3	0	0	0	0	3
City of Parker	184	59	0	0	0	243
Unincorporated Bay County	480	0	0	0	0	480
Total	**43,572**	**18,452**	**6,640**	**2,295**	**1,611**	**72,570**
Change						
Tyndall AFB	973	1,732	-963	-252	-94	1,396
Open Water	8,063	-627	93	-140	0	7,389
City of Callaway	1	0	0	0	0	1
Panama City	3	0	0	0	0	3
City of Parker	81	22	0	0	0	103
Unincorporated Bay County	-54	-119	-17	0	0	-190
Total	**9,067**	**1,008**	**-887**	**-392**	**-94**	**8,702**

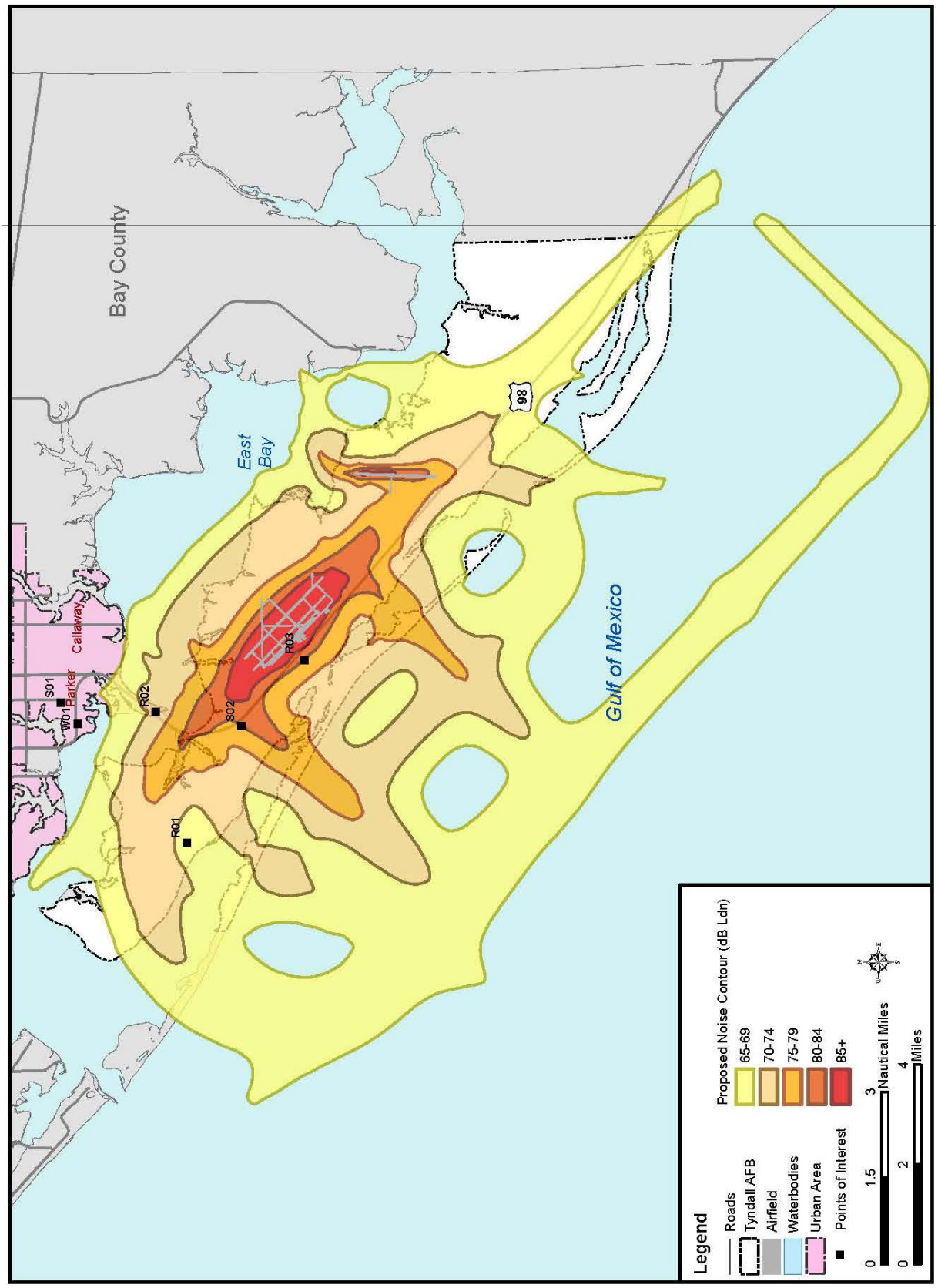

Figure 4–1. Noise Contours under the Proposed Action

Under the Proposed Action, L_{dn} at the Wood Manor housing area and the Parker Elementary School would increase relative to baseline conditions by 1 and 2 dB, respectively. L_{dn} at the other representative locations studied would not change (Table 4–2). Persons at both locations could experience minor increases in annoyance if an increase in aircraft noise were noticed. The L_{dn} at Parker Elementary School would not exceed 65 dB, the level at which schools are normally considered to be an incompatible land use. F-22 aircraft departing runway 1R and maneuvering to make a second instrument approach are a primary contributor to L_{dn} at the Parker Elementary School.

Table 4–2. Noise Levels at Representative Noise-Sensitive Locations under Baseline Conditions and Proposed Action

Loc. ID	Location Description	Day-Night Average Sound Levels (L_{dn})	Potential Speech Interference Events Per Hour [1]		Probability of Awakening [2]	
			(windows open)	(windows closed)	(windows open)	(windows closed)
Baseline Conditions						
R01	Wood Manor (on-base accompanied housing area)	68	9	5	11%	6%
R02	City of Parker	72	17	11	17%	10%
R03	Tyndall AFB Dorms	80	19	16	30%	18%
S01	Parker Elementary School	57	11	2	N/A	N/A
S02	Tyndall Elementary School	80	20	18	N/A	N/A
W01	First Baptist Church of Parker	60	10	4	N/A	N/A
Proposed Action						
R01	Wood Manor (on-base accompanied housing area)	69	8	5	12%	7%
R02	City of Parker	72	12	10	18%	10%
R03	Tyndall AFB Dorms	80	13	12	27%	17%
S01	Parker Elementary School	59	9	3	N/A	N/A
S02	Tyndall Elementary School	80	15	12	N/A	N/A
W01	First Baptist Church of Parker	60	9	3	N/A	N/A

Note:

1. Number of events per hour at or above an indoor maximum (single-event) Sound level (L_{max}) of 50 dB; assuming outdoor-to-indoor noise level reductions of 12 dB and 24 dB for windows open and closed, respectively; for schools considered school day hours (7:00 AM TO 3:00 PM) and at non-school locations, considered hours between 7:00 AM and 10:00 PM.
2. Probability of awakening at least once per night as a result of aircraft noise as per methodology in ANSI/Acoustical Society of America (ASA) S12.9-2008 Part 6 assuming outdoor-to-indoor noise level reductions of 12 dB and 24 dB for windows open and closed, respectively.

The average number of overflight events per hour with potential to interrupt speech when windows are open would decrease relative to baseline conditions at all representative locations studied. Under a windows-closed scenario, events per hour with potential to interfere with speech would decrease at all locations except at Parker Elementary School, where the number would increase from two to three per hour. A decrease in events with speech interference potential under a windows open scenario (less structural noise attenuation) and an increase under a windows closed scenario (more structural attenuation) reflects a proportional increase in relatively loud F-22 overflights and a decrease in the frequency of quieter overflights.

The probability of a person being awoken at least once per night by aircraft noise under a windows closed scenario would increase by 1 percent in the Wood Manor housing area, remain the same in the City of Parker, and decrease by 3 percent at the Tyndall AFB dorms studied. Under a windows closed scenario, the change in probability of a person being awoken relative

to baseline conditions would be the same as for the windows closed scenario except at the Tyndall AFB dorms studied, where the percentage would decrease by 2 percent.

As per a DoD policy memorandum published in 2009, populations exposed to noise at or greater than 80 L_{dn} are at the greatest risk of PHL (UDATL 2009; USEPA 1982). Under the Proposed Action, the number of structures affected by greater than 80 L_{dn} would decrease from 349 to 308. Workers on Tyndall AFB would continue to be protected against possible noise impacts by adherence to the DoD noise management guidelines. Seven residential structures affected by greater than 80 L_{dn} under baseline conditions would no longer be affected. The Tyndall AFB dorms studied and Tyndall Elementary School would continue to be affected by noise levels at 80 L_{dn} under the Proposed Action. The Tyndall AFB Bioenvironmental Engineering Office takes into account several factors including structural noise attenuation when deciding how to implement the Hearing Conservation Program. Implementation of the Proposed Action would have either beneficial impacts or no impact on PHL risk.

Construction projects conducted under the Proposed Action would be conducted in the Tyndall AFB flightline area and at (or near) the MSA. Areas in which construction would occur are not considered particularly noise sensitive and are exposed to frequent, high-intensity aircraft noise. Construction noise would be temporary, as it would last only for the duration of the construction projects. In addition, construction noise would be limited to normal working hours (7:00 AM to 5:00 PM). As required, construction workers would wear hearing protection in accordance with applicable laws and regulations. Noise impacts associated with construction projects under the Proposed Action would be minor and insignificant in nature. Overall, it is not expected that noise impacts associated with the Proposed Action would be perceived as significant in nature.

Airspace - Table 4–3 lists noise levels beneath primary use MOAs and their associated ATCAAs under baseline conditions and the Proposed Action. Increases in noise resulting from proposed F-22 and T-38 operations would result in a net change of less than 1 dB L_{dnmr} as compared to baseline noise levels. Impacts associated with the proposed change in flying operations would be negligible.

Table 4–3. Noise Levels beneath Military Operations Areas (MOAs) under Baseline Conditions and the Proposed Action

Airspace Unit*	Monthly Day-Night Average Sound Level (L_{dnmr}) in decibels (dB)	
	Baseline	Proposed
Tyndall AFB B MOA	62	62
Tyndall AFB C/H MOA	58	58
Tyndall AFB D MOA	58	58
Tyndall AFB E MOA	58	58
Tyndall AFB F MOA	44	44
Tyndall AFB G MOA	67	67

Note: * Air Traffic Controlled Assigned Airspace (ATCAA) supersonic approved above 30,000 Mean Sea Level (MSL); sonic booms would not be expected to propagate to the ground.

Supersonic time-averaged noise levels would be increased by 2 dB L_{cdn} in W-151A/B/C/D but would be increase by less than 1 dB in W-470A/B/C/D/E/F (Table 4–4). The average number of sonic booms experienced per day would increase in W-151A/B/C/D by 0.5 and in W-470A/B/C/D/E/F by 0.4 near the center of the airspace units. Supersonic noise levels and

the number of booms per day would be lower in areas not at the center of the airspace. In the ATCAAs overlying the Tyndall MOAs, supersonic flight is not permitted below 30,000 MSL, and sonic booms would not normally propagate to the ground. The magnitude of individual sonic boom overpressures (psf) would not change relative to baseline conditions as F-22 aircraft currently fly in the training airspace (Table 3-8). Changes in time-averaged noise levels reflect the net effect of reductions in the frequency of F-15 supersonic airspace operations relative to baseline conditions and the addition of F-22 supersonic operations. Increased sonic booms in areas beneath W-151 subunits may be noticed by persons that spend large amounts of time on the water, such as fishermen, and could be considered annoying. The percentage of persons highly annoyed by the noise would be expected to be less than indicated in Table 3–2 since affected persons do not generally remain beneath the airspace for long periods. Overall, the impacts of supersonic noise generated by F-22 operations under the Proposed Action would be minor and insignificant in nature.

Table 4–4. Noise Levels beneath Warning Areas under Baseline Conditions and the Proposed Action

Airspace Unit	Baseline		Proposed	
	C-Weighted Day–Night Average Sound Level (L_{cdn}) in decibels (dB)	Average Booms Per Day [2]	C-Weighted Day–Night Average Sound Level (L_{cdn}) (dB)	Average Booms Per Day [2]
W-151A/B/C/D [1]	51	0.7	53	1.2
W-470 A/B/C/D/E/F [1]	56	2.1	56	2.5

Notes:
[1] Supersonic approved above 10,000 Mean Sea Level (MSL).
[2] Near the center of the airspace units.

4.2.3 Alternative 1

Installation – Alternative 1 would differ from the Proposed Action in that only 10 T-38 PAA would beddown at Tyndall AFB instead of 20 PAA. Time-averaged noise levels (i.e., L_{dn}) are generally affected most strongly by operation of the loudest aircraft type present. In the case of Tyndall AFB, the loudest based aircraft type present under baseline conditions and Alternative 1 is the F-22. Beddown of 10 PAA T-38 under Alternative 1 as opposed to 20 PAA T-38 would result in changes in L_{dn} that would be very similar to those predicted under the Proposed Action. Noise contours reflecting conditions under Alternative 1 and baseline conditions are shown in Figure 4–2. The number of acres of land and water area affected by various noise increments is listed in Table 4–5**.** The increase in total area affected by greater than 65 L_{dn} would be 8,648 acres under Alternative 1 with the vast majority (7,346 acres) of additional area being in open water areas. An additional 106 acres would be affected by noise levels greater than 65 L_{dn} in the City of Callaway, Panama City, and the City of Parker while 191 fewer acres in unincorporated portions of Bay County would be affected by greater than 65 L_{dn}. An estimated 781 off-installation residents would be affected by greater than 65 L_{dn} under Alternative 1.

Table 4–5. Noise Exposures under Alternative 1 and Baseline Conditions

Location	Geographic Area (in Acres) Exposed to Indicated Noise Levels (in Day-Night Average Sound Levels [L_{dn})					
	65-70	70-75	75-80	80-85	>85	Total
Baseline						
Tyndall Air Force Base (AFB)	5,657	6,378	5,370	2,319	1,705	21,429
Open Water	28,192	10,910	2,140	368	0	41,610
City of Callaway	19	0	0	0	0	19
Panama City	0	0	0	0	0	0
City of Parker	103	37	0	0	0	140
Unincorporated Bay County	534	119	17	0	0	670
Total	**34,505**	**17,444**	**7,527**	**2,687**	**1,705**	**63,868**
Alternative 1						
Tyndall AFB	6,651	8,113	4,399	2,058	1,595	22,816
Open Water	36,255	10,259	2,218	224	0	48,956
City of Callaway	19	0	0	0	0	19
Panama City	3	0	0	0	0	3
City of Parker	183	60	0	0	0	243
Unincorporated Bay County	479	0	0	0	0	479
Total	**43,590**	**18,432**	**6,617**	**2,282**	**1,595**	**72,516**
Changes						
Tyndall AFB	994	1,735	-971	-261	-110	1,387
Open Water	8,063	-651	78	-144	0	7,346
City of Callaway	0	0	0	0	0	0
Panama City	3	0	0	0	0	3
City of Parker	80	23	0	0	0	103
Unincorporated Bay County	-55	-119	-17	0	0	-191
Total	**9,085**	**988**	**-910**	**-405**	**-110**	**8,648**

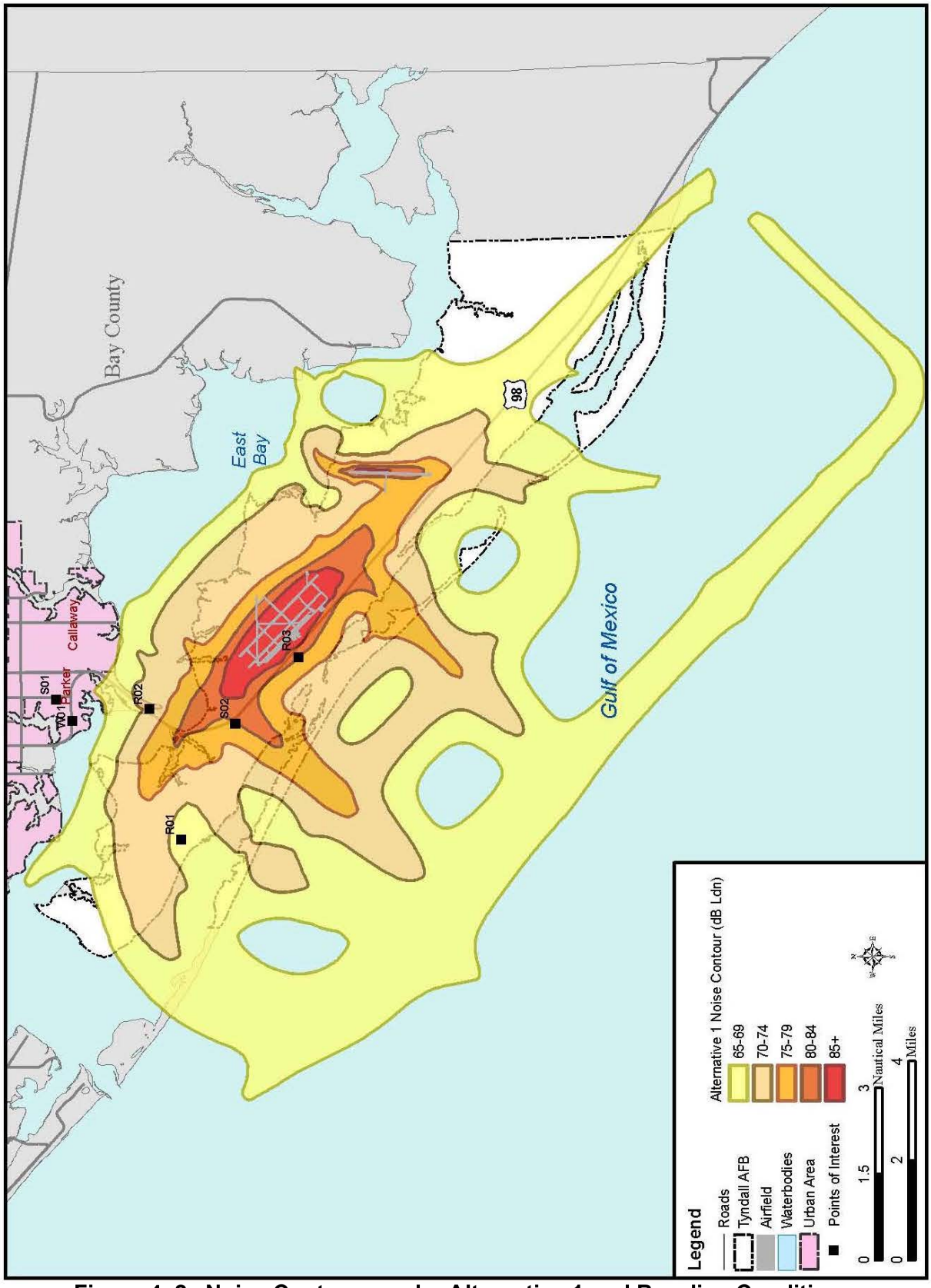

Figure 4–2. Noise Contours under Alternative 1 and Baseline Conditions

Changes in L_{dn} at the six noise sensitive locations studied would be the same under Alternative 1 as under the Proposed Action (Table 4–6). Noise conditions at several representative noise-sensitive receptors under Alternative 1 and baseline conditions are presented in Table 4–6. The average number of aircraft noise events per hour with potential to interrupt speech under Alternative 1 would decrease or remain the same at all noise sensitive locations studied under the windows open scenario. Under the windows closed scenario, the number of events with potential to interrupt speech at Parker Elementary School would increase from two to three. Under Alternative 1, the probability of a person being awoken at least once per night on average would decrease or remain the same at each of the three residential representative noise sensitive locations under both windows open and windows closed scenarios.

Table 4–6. Noise Levels at Representative Noise-Sensitive Locations under Baseline Conditions and Alternative 1

Location ID	Location Description	Day–Night Average Sound Level (L_{dn}) (outdoors)	Potential Speech Interference Events Per Day		Probability of Awakening	
			(windows closed)	(windows open)	(windows closed)	(windows open)
Baseline Conditions						
R01	Wood Manor (on-base accompanied housing area)	68	9	5	11%	6%
R02	City of Parker	72	17	11	17%	10%
R03	Tyndall AFB Dorms	80	19	16	30%	18%
S01	Parker Elementary School	57	11	2	N/A	N/A
S02	Tyndall Elementary School	80	20	18	N/A	N/A
W01	First Baptist Church of Parker	60	10	4	N/A	N/A
Alternative 1						
R01	Wood Manor (on-base accompanied housing area)	69	8	5	11%	6%
R02	City of Parker	72	11	9	16%	9%
R03	Tyndall AFB Dorms	80	12	10	25%	15%
S01	Parker Elementary School	59	9	3	N/A	N/A
S02	Tyndall Elementary School	80	13	11	N/A	N/A
W01	First Baptist Church of Parker	60	8	3	N/A	N/A

Notes:

1. Number of events per hour at or above an indoor maximum (single-event) sound level (L_{max}) of 50 dB; assuming outdoor-to-indoor noise level reductions of 12 dB and 24 dB for windows open and closed, respectively; for schools considered school day hours (7:00 AM to 3:00 PM) and at non-school locations, considered hours between 7:00 AM and 10:00 PM.
2. Probability of awakening at least once per night as a result of aircraft noise as per methodology in ANSI/ASA S12.9-2008 Part 6 assuming outdoor-to-indoor noise level reductions of 12 dB and 24 dB for windows open and closed, respectively.

The types of construction projects proposed under Alternative 1 and hence the types of equipment used, would be the same as those under the Proposed Action. As would be the case under the Proposed Action, areas near construction sites would be exposed to noise levels that could be considered annoying; however, noise impacts would be temporary and limited to normal working hours. Construction workers would wear hearing protection, as required in accordance with applicable laws and regulations. Overall, noise impacts under Alternative 1 in the installation vicinity would be minor and not be expected to be considered significant in nature.

The number of structures affected by greater than 80 L_{dn} would decrease from 349 to 308 under Alternative 1. Workers on Tyndall AFB would continue to be protected against possible noise impacts by adherence to the DoD noise management guidelines. Six fewer residential structures would be affected by greater than 80 L_{dn} under Alternative 1 than under baseline conditions. The Tyndall AFB dorms studied and Tyndall Elementary School would continue to be affected by noise levels at 80 L_{dn}. The Tyndall AFB Bioenvironmental Engineering Office takes into account several factors including structural noise attenuation when deciding how to implement the Hearing Conservation Program. If Alternative 1 were implemented, hearing loss risk impacts would be positive and minor.

Airspace - Changes in supersonic and subsonic noise levels beneath training airspace would be the same under Alternative 1 as under the Proposed Action (Table 4–7). Alternative 1 would include fewer T-38 training sortie operations than the Proposed Action; however, T-38 training operations are relatively quiet compared to other aircraft types, such as the F-22 and F-35A, and as such, the effect of reductions in T-38 operations on overall noise levels is small.

Table 4–7. Noise Levels beneath Military Operations Area (MOA) under Baseline Conditions and Alternative 1

Airspace Unit *	Monthly Day-Night Average Sound Level (L_{dnmr}) in decibels (dB)	
	Baseline	Proposed
Tyndall B MOA	62	62
Tyndall C/H MOA	58	58
Tyndall D MOA	58	58
Tyndall E MOA	58	58
Tyndall F MOA	<45	44
Tyndall G MOA	67	67

Note: *Air Traffic Control Assigned Airspace (ATCAA) supersonic approved above 30,000 MSL; sonic booms would not be expected to propagate to the ground.

T-38 aircraft based at Tyndall AFB would not conduct supersonic training; therefore, the reduction in T-38 sortie operations in Alternative 1 relative to the Proposed Action has no effect on supersonic noise levels. Supersonic noise levels associated with implementation of Alternative 1 would be approximately the same as impacts described for the Proposed Action (Table 4–8) and it is not expected that they would be perceived as significant.

Table 4–8. Noise Levels beneath Warning Areas under Baseline Conditions and Alternative 1

Airspace Unit	Baseline		Proposed	
	C-Weighted Day–Night Average Sound Level (L_{cdn}) in decibels (dB)	Average Booms Per Day [2]	C-Weighted Day–Night Average Sound Level (L_{cdn}) (dB)	Average Booms Per Day [2]
W-151A/B/C/D [1]	51	0.7	53	1.2
W-470 A/B/C/D/E/F [1]	56	2.1	56	2.5

Notes:
[1] Supersonic approved above 10,000 Mean Sea Level (MSL).
[2] Near the center of the airspace units.

4.2.4 No Action Alternative

Installation – Under the No Action Alternative, no additional F-22 aircraft or T-38 aircraft would beddown at Tyndall AFB. A reduction in F-15 flying operations has resulted in reduced time-averaged noise levels near the installation. Noise contours reflecting the No Action Alternative are shown in Figure 4–3 and acres exposed to various L_{dn} intervals are shown in Table 4–9. The total area exposed to greater than 65 L_{dn} decreased by 22,621 acres as compared to the 2008 AICUZ. The estimated number of off-installation residents exposed to greater than 65 L_{dn} decreased from 593 to 231 under the No Action Alternative.

Table 4–9. Noise Exposures under the No Action Alternative and Baseline Conditions

Location	Geographic Area (in Acres) Exposed to Indicated Noise Levels in Day-Night Average Sound Levels L_{dn})					
	65-70	70-75	75-80	80-85	>85	Total
Baseline						
Tyndall Air Force Base (AFB)	5,657	6,378	5,370	2,319	1,705	21,429
Open Water	28,192	10,910	2,140	368	0	41,610
City of Callaway	19	0	0	0	0	19
Panama City	0	0	0	0	0	0
City of Parker	103	37	0	0	0	140
Unincorporated Bay County	534	119	17	0	0	670
Total	**34,505**	**17,444**	**7,527**	**2,687**	**1,705**	**63,868**
No Action Alternative						
Tyndall AFB	6,235	6,956	3,158	1,334	1,166	18,849
Open Water	15,319	6,067	744	31	0	22,161
City of Callaway	0	0	0	0	0	0
Panama City	0	0	0	0	0	0
City of Parker	82	5	0	0	0	87
Unincorporated Bay County	150	0	0	0	0	150
Total	**21,786**	**13,028**	**3,902**	**1,365**	**1,166**	**41,247**
Change						
Tyndall AFB	578	578	-2,212	-985	-539	-2,580
Open Water	-12,873	-4,843	-1,396	-337	0	-19,449
City of Callaway	-19	0	0	0	0	-19
Panama City	0	0	0	0	0	0
City of Parker	-21	-32	0	0	0	-53
Unincorporated Bay County	-384	-119	-17	0	0	-520
Total	**-12,719**	**-4,416**	**-3,625**	**-1,322**	**-539**	**-22,621**

Noise conditions at several representative noise-sensitive receptors are presented in Table 4–10. Under the No Action Alternative, L_{dn}, the average frequency of speech interference and the probability of sleep interference decreased at all of the noise sensitive locations studied as compared to noise levels in the 2008 AICUZ.

Table 4–10. Noise Levels at Representative Noise-Sensitive Locations under Baseline Conditions and the No Action Alternative

Location ID	Location Description	Day–Night Average Sound Level (L_{dn}) (outdoor)	Potential Speech Interference Events Per Day		Probability of Awakening	
			(windows closed)	(windows open)	(windows closed)	(windows open)
Baseline Conditions						
R01	Wood Manor (on-base accompanied housing area)	68	9	5	11%	6%
R02	City of Parker	72	17	11	17%	10%
R03	Tyndall AFB Dorms	80	19	16	30%	18%
S01	Parker Elementary School	57	11	2	N/A	N/A
S02	Tyndall Elementary School	80	20	18	N/A	N/A
W01	First Baptist Church of Parker	60	10	4	N/A	N/A
No Action Alternative						
R01	Wood Manor (on-base accompanied housing area)	55	7	2	N/A	N/A
R02	City of Parker	78	9	8	N/A	N/A
R03	Tyndall AFB Dorms	78	8	7	13%	7%
S01	Parker Elementary School	66	5	3	5%	3%
S02	Tyndall Elementary School	69	8	7	8%	4%
W01	First Baptist Church of Parker	58	6	2	N/A	N/A

Notes:

1. Number of events per hour at or above an indoor maximum (single-event) sound level of 50 dB; assuming outdoor-to-indoor noise level reductions of 12 dB and 24 dB for windows open and closed, respectively; for schools considered school day hours (7:00 AM to 3:00 PM) and at non-school locations, considered hours between 7:00 AM and 10:00 PM.
2. Probability of awakening at least once per night as a result of aircraft noise as per methodology in ANSI/ASA S12.9-2008 Part 6 assuming outdoor-to-indoor noise level reductions of 12 dB and 24 dB for windows open and closed, respectively.

Under the No Action Alternative, 156 fewer structures on Tyndall AFB are exposed to noise levels at or greater than 80 L_{dn} than under baseline conditions. Of the 193 structures that continue to be affected by noise levels at or greater than 80 L_{dn}, 13 are residential. Workers on Tyndall AFB continue to be protected against possible occupational noise impacts by adherence to the DoD noise management guidelines. The Tyndall AFB Bioenvironmental Engineering Office continues to consider several factors including structural noise attenuation when deciding how to implement the Hearing Conservation Program.

No construction projects would take place under the No Action Alternative, and no additional construction noise would be generated. Overall, noise impacts in the installation vicinity under the No Action Alternative would be positive and insignificant in nature.

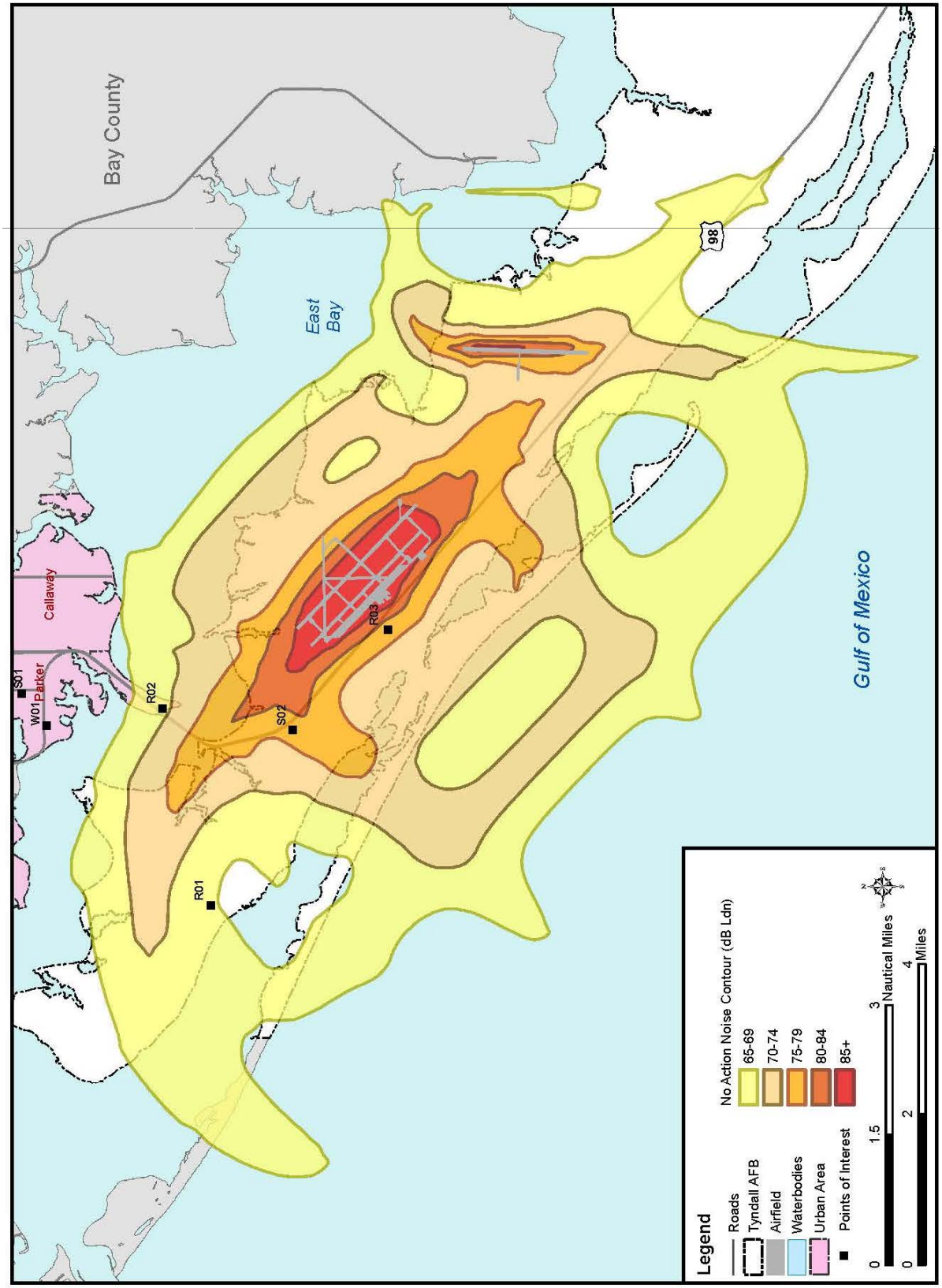

Figure 4–3. Noise Contours under the No Action Alternative and Baseline Conditions

Airspace – Sub- and supersonic noise levels decreased under the No Action Alternative beneath all training airspace units due to the drawdown of F-15 aircraft from Tyndall AFB (Table 4–11 and Table 4–12). Noise impacts beneath the training airspace would be positive and insignificant under this alternative.

Table 4–11. Noise Levels beneath Military Operations Areas (MOAs) under Baseline Conditions and the No Action Alternative

Airspace Unit *	Monthly Day-Night Average Sound Level (L_{dnmr}) in decibels (dB)	
	Baseline	Proposed
Tyndall B MOA	62	61
Tyndall C/H MOA	58	57
Tyndall D MOA	58	57
Tyndall E MOA	58	57
Tyndall F MOA	<45	43
Tyndall G MOA	67	66

Note: *Air Traffic Control Assigned Airspace (ATCAA) supersonic approved above 30,000 Mean Sea Level (MSL); sonic booms would not be expected to propagate to the ground.

Table 4–12. Noise Levels beneath Warning Areas under Baseline Conditions and the No Action Alternative

Airspace Unit	Baseline		Proposed	
	C-Weighted Day–Night Average Sound Level (L_{cdn}) in decibels (dB)	Average Booms Per Day [2]	C-Weighted Day–Night Average Sound Level (L_{cdn}) (dB)	Average Booms Per Day [2]
W-151A/B/C/D [1]	51	0.7	50	0.5
W-470 A/B/C/D/E/F [1]	56	2.1	54	1.6

Notes:
[1] Supersonic approved above 10,000 Mean Sea Level (MSL).
[2] Near the center of the airspace units.

4.3 Safety

4.3.1 Methodology for Analysis

Numerous federal, civil, and military laws and regulations govern operations at Tyndall AFB and in the surrounding airspace. Individually and collectively, those laws and regulations prescribe measures, processes, and procedures necessary to ensure safe operations and to protect the public, military, and property.

The elements of the proposal that have a potential to affect safety are evaluated relative to the degree to which the action increases or decreases safety risks to the public or private property. Ground, airfield, explosives, and flight safety are assessed for the potential to increase risk and the capability to manage that risk by responding to emergencies. Analysis of flight safety data and reliability studies for F-22 and T-38 aircraft operations takes into account the reliability of these systems and potential accident risks. Since flight operations would occur where Air Force aircraft currently operate, Air Force accident classifications would be utilized in this evaluation.

4.3.2 Proposed Action

4.3.2.1 Ground Safety

No aspects of the Proposed Action for Tyndall AFB are expected to create new or unique ground safety issues. O&M procedures conducted by base personnel would not change from current conditions. All activities would continue to be conducted in accordance with applicable regulation, technical orders, and AFOSH standards.

The newly constructed buildings would be built in compliance with AT/FP requirements and would be located outside any identified Q-D arcs for explosive safety. The Air Force does not anticipate any significant impacts to ground safety due to of construction, demolition, or renovation if all applicable AFOSH and OSHA requirement are implemented.

4.3.2.2 Airfield Safety

Proposed construction, renovation, and infrastructure improvement projects related to the alternatives would be consistent with established APZs. The addition to the egress facility (Building 126) would breach the 7:1 Transitional Surface. Before construction can take place, an airfield waiver would need to be processed and approved by AETC or ACC depending on the timing of the construction and the major command Tyndall AFB reports to at that time. Therefore, construction activity and subsequent operations within new or renovated structures would not result in any greater safety risk, and no significant impact related to APZs would occur. The basing of additional F-22 and new T-38 aircraft would not affect current airfield waivers and many of the current structures or other existing exceptions would be relocated or removed as funding allows.

4.3.2.3 Explosive Safety

Tyndall AFB controls, maintains, and stores all ordnance and munitions required for mission performance in accordance with Air Force and DDESB safety procedures. All munitions maintenance is carried out by trained, qualified personnel using Air Force-approved technical data for the specific type of ordnance. The Air Force imposes procedures for arming and de-arming munitions and ordnance. All such activities occur on defined arm/de-arm pads. An arm/de-arm pad is located at specified distances away from incompatible land uses for safety standards compliance. The Air Force and DDESB procedures require safeguards on weapons systems and ordnance that ensure against inadvertent releases.

The existing explosive clear zones including and surrounding the existing MSA cover an area of about 400 acres. A recent expansion of the MSA added approximately 55 acres to the clear zones in the southern portion of the MSA. Under the Proposed Action, the other project areas located outside the MSA would not fall within an established or expanded Q-D arcs. Proposed construction, renovation, and infrastructure improvement projects would be consistent with established Q-D arcs. Therefore, construction activity and subsequent operations would not result in any significantly greater explosives safety risk or require changes to the current Q-D arcs. Managing these safety risks in accordance with the established DoD and Air Force standards would not result in any significant impact to public health, safety, or the environment.

4.3.2.4 Flight Safety

Aircraft Mishaps - The F-22 and T-38 aircraft at Tyndall AFB would operate in an airfield environment and in the airspace similar to the current operational environment. The new T-38 airframes at Tyndall AFB would require response actions specific to those aircraft. The Tyndall AFB emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving the additional F-22 and new T-38 aircraft and associated equipment. Capability for fire response is located on the base and in the surrounding communities. The base fire department is party to mutual aid support agreements with these nearby communities. These functions would continue to occur as they have under current conditions and capability to respond to airfield incidents would continue, as they currently exist. The existing response capability, coupled with appropriate updates to emergency response plans, would result in similar airfield safety conditions, similar to that which currently exists.

As stated in Section 3.3.2.4, due to the immaturity of the F-22 platform, its' early operational status, and low number of flight hours as compared to legacy platforms (only eight years for the F-22 compared to the longer lifetimes of the other aircraft), the F-22 has the highest accident rate of any USAF fighter aircraft in service. This rate is expected to go down as the Air Force gains more experience in operating and maintaining the aircraft. Therefore, no significant increase in aircraft mishaps is anticipated from implementation of the Proposed Action at Tyndall AFB.

BASH - Tyndall AFB and Vicinity - Tyndall AFB has an ongoing BASH program. Since future aircraft flight operations would remain similar to those currently being experienced at Tyndall AFB, the overall potential for bird-aircraft or wildlife strikes is not anticipated to be significantly greater than current levels. F-22 and T-38 aircrews operating in Tyndall AFB airspace would be required to continue the applicable procedures outlined in the Tyndall AFB BASH Plan. Tyndall AFB personnel developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes and has documented detailed procedures to monitor and react to heightened risk of bird-strikes. When BASH risks increase, limits are placed on low altitude flight and some types of training (e.g., multiple approaches and closed pattern work) in the airport and airspace environments. Special briefings are provided to pilots whenever the potential exists for greater bird-strike sightings within the airspace. Pilots would be subject to these procedures. Class A mishap and bird strike risks are expected to be proportional to the amount of training time in the airspace and not expected to be significant. Based upon experience with current training in the airspace and around the airfield, approximately 15 to 20 annual strikes are expected with none resulting in a Class A mishap. Therefore, no significant impact would occur related to BASH issues.

4.3.3 Alternative 1

Under Alternative 1, 21 F-22 PAA and only 10 T-38 PAA would be beddown at Tyndall AFB. The construction activities described are the same as those under the Proposed Action. Impacts from this alternative are similar to those in the Proposed Action and therefore, no significant impacts to ground, flight, or explosive safety are expected.

4.3.4 No Action Alternative

Under the No Action Alternative, the F-22 operational squadron and the T-38 detachment would not beddown at Tyndall AFB. No construction activities or personnel changes would take place. Tyndall AFB would continue to support the F-22 training squadron as well as the other training aircraft such as the QF-4. Airfield operations and sortie-operations would not change from current conditions.

4.4 Air Quality

4.4.1 Methodology for Analysis

To evaluate air emissions and their impact on the overall ROI, the emissions associated with the project activities are compared to the total county emissions on a pollutant-by-pollutant basis, using the ROI's 2002 NEI data. Potential impacts to air quality are evaluated with respect to the extent, context, and intensity of the impact in relation to relevant regulations, guidelines, and scientific documentation. CEQ defines significance in terms of context and intensity in 40 CFR 1508.27. It is required that the significance of the action be analyzed in respect to the setting of the Proposed Action and relative to the severity of the impact. The CEQ NEPA regulations (40 CFR 1508.27(b)) provide ten key factors to consider in determining an impact's intensity.

For a conservative analysis, Bay County was selected as the ROI instead of the USEPA-designated Air Quality Control Region (AQCR), which is a much larger area. Calculated air emissions were compared to the annual total emissions of Bay County.

The Air Conformity Applicability Model (ACAM) (version 4.3.0) is also utilized to provide a level of consistency with respect to emissions factors and calculations. The ACAM provides estimated air emissions from proposed federal actions in areas designated as nonattainment and/or maintenance for each criterion and precursor pollutant, as defined in the NAAQS. The ACAM is utilized to provide emissions for construction, grading, and paving activities by providing user inputs for each. The air quality analysis focuses on emissions associated with the construction activities, additional personnel, flight operations, and munitions use.

4.4.2 Proposed Action

Construction - The use of large construction equipment for site preparation and the construction of the aforementioned facilities are analyzed to determine emissions. Construction activities would cause temporary increases in the regional air quality but would be minimal as shown in Table 4–13 and Table 4–14. Construction emissions would not cause significant impacts to the region's air quality nor would they exceed the NAAQS. Carbon dioxide emissions were estimated for the use of construction equipment and worker commutes during the construction period and aircraft operations. Currently there are no thresholds of significance established, thus these numbers are provided for informational purposes only. To provide a reference point, the emissions are compared to Florida State's ten-year average for greenhouse gas emissions.

Table 4–13. Proposed Action Air Emissions Compared to Bay County

Emission Activities	Emissions (tons/year)						
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2
Construction Emissions	28.71	10.65	45.68	45.68	1.23	2.12	6,907.08
Point Source	1.59	0.79	0.84	0.84	0.29	5.95	0.00
Personnel Commute	2.13	0.88	0.09	0.09	0.06	0.20	95.79
Aircraft Emissions	2,100.20	1,089.52	146.29	146.29	84.14	358.87	269,435.78
Airspace Emissions	0.03	0.82	0.04	0.04	0.03	0.00	50.83
Total [1]	**2,132.66**	**1,102.65**	**192.95**	**192.95**	**85.76**	**367.14**	**276,489.49**
Bay County Emissions	56,053.76	12,745.88	9,933.75	3,274.57	16,973.60	11,428.70	267.43 MT [2]
Percentage of County Emissions	3.80%	8.65%	1.94%	5.89%	0.51%	3.21%	0.10%

Notes:
[1] Column totals may not add up to the total listed due to rounding in the lines of data.
[2] This is the 10-year average CO_2 emission level for the state of Florida (1997-2007). There are no standards to determine significance of CO_2 emissions at this time. Information is provided to give context for the project emissions.

Key:
CO = Carbon Monoxide
NO_x = Nitrogen Dioxide
SO_2 = Sulfur Dioxide
CO_2 = Carbon Dioxide
$PM_{2.5}$ = Particulate Matter less than 2.5 microns in diameter
VOC = Volatile Organic Compounds
MT = Million Tons
PM_{10} = Particulate Matter less than 2.5 microns in diameter

Table 4–14. Proposed Action Air Emissions Compared to the NAAQS

Criteria Pollutant	Averaging Time	NAAQS (ppm)	Calculated Concentration (ppm)			
			Construction	Personnel	Aircraft	Airspace
Carbon Monoxide (CO)	1-Hour	35	2.885E-07	2.026E-08	1.568E-05	2.959E-10
	8-Hour	9	2.885E-07	2.026E-08	1.568E-05	2.959E-10
Nitrogen Dioxide (NO_x)	Annual	0.053	1.240E-08	9.566E-10	8.671E-07	8.870E-10
Sulfur Dioxide (SO_2)	3-Hour	0.5	6.338E-09	2.688E-10	4.385E-07	1.420E-10
	24-Hour	0.14	6.338E-09	2.688E-10	4.385E-07	1.420E-10
	Annual	0.03	6.338E-09	2.688E-10	4.385E-07	1.420E-10
Particulate Matter less than 10 microns in diameter (PM_{10})	24-Hour	150 $\mu g/m^3$	0.507 $\mu g/m^3$	0.001 $\mu g/m^3$	1.539 $\mu g/m^3$	0 $\mu g/m^3$
	Annual	50 $\mu g/m^3$	0.507 $\mu g/m^3$	0.001 $\mu g/m^3$	1.539 $\mu g/m^3$	0 $\mu g/m^3$
Particulate Matter less than 2.5 microns in diameter ($PM2_{.5}$)	24-hour	65 $\mu g/m^3$	0.507 $\mu g/m^3$	0.001 $\mu g/m^3$	1.539 $\mu g/m^3$	0 $\mu g/m^3$
	Annual	15 $\mu g/m^3$	0.507 $\mu g/m^3$	0.001 $\mu g/m^3$	1.539 $\mu g/m^3$	0 $\mu g/m^3$
Total Suspended Particulates (TSP)	24-hour	150 $\mu g/m^3$	1.014 $\mu g/m^3$	0.002 $\mu g/m^3$	3.079 $\mu g/m^3$	0.001 $\mu g/m^3$
	Annual	60 $\mu g/m^3$	1.014 $\mu g/m^3$	0.002 $\mu g/m^3$	3.079 $\mu g/m^3$	0.001 $\mu g/m^3$

Key:
NAAQS = National Ambient Air Quality Standards
ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter

Operational - Operational emissions include the additional personnel commute, aircraft operations, and munitions use. Personnel commute would cause only a slight increase in air emissions. The bulk of the change to emission rates would be air operations; as only inert munitions would be used, they were not analyzed. Aircraft emissions would be below the NAAQS. No significant impact to regional air quality is expected from the operational aspect of the Proposed Action.

4.4.3 Alternative 1

Construction - Emissions for Alternative 1 from construction activities and personnel relocated to Tyndall AFB would be the same as the emissions generated from the Proposed Action. The resultant emissions are summarized in Table 4–15 and Table 4–16. No adverse impacts are expected and the NAAQS would not be exceeded under the Alternative 1 actions.

Table 4–15. Alternative 1 Air Emissions Compared to Bay County

Emission Activities	Emissions (tons/year)						
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2
Aircraft Emissions	1,879.96	777.30	133.58	133.58	71.43	294.33	257,168
Airspace Emissions	0.03	0.69	0.04	0.04	0.03	0.00	48
Total [1]	**1879.99**	**777.99**	**133.62**	**133.62**	**71.46**	**294.33**	**257,216**
Bay County Emissions	56,053.76	12,745.88	9,933.75	3,274.57	16,973.60	11,428.70	267.43 MT[2]
Percentage of County Emissions	3.35%	6.09%	1.34%	4.08%	0.42%	2.58%	0.10%

Notes:
[1] Column totals may not add up to the total listed due to rounding in the lines of data.
[2] This is the 10-year average CO_2 emission level for the state of Florida (1997-2007). There are no standards to determine significance of CO_2 emissions at this time. Information is provided to give context for the project emissions.

Key:
CO = Carbon Monoxide
CO_2 = Carbon Dioxide
NOx = Nitrogen Dioxide
MT = Million Tons
$PM_{2.5}$ = Particulate Matter less than 2.5 microns in diameter
PM_{10} = Particulate Matter less than 2.5 microns in diameter
SO_2 = Sulfur Dioxide
VOC = Volatile Organic Compounds

Table 4–16. Alternative 1 Air Emissions Compared to the NAAQS

Criteria Pollutant	Averaging Time	NAAQS (ppm)	Calculated Concentration (ppm)			
			Construction	Personnel	Aircraft	Airspace
Carbon Monoxide (CO)	1-Hour	35	2.833E-07	3.653E-07	1.790E-05	2.479E-10
	8-Hour	9	2.833E-07	3.653E-07	1.790E-05	2.479E-10
Nitrogen Dioxide (NO_x)	Annual	0.053	1.227E-08	2.054E-09	8.427E-07	7.476E-10
Sulfur Dioxide (SO_2)	3-Hour	0.5	5.726E-09	2.688E-10	2.974E-07	1.282E-10
	24-Hour	0.14	5.726E-09	2.688E-10	2.974E-07	1.282E-10
	Annual	0.03	5.726E-09	2.688E-10	2.974E-07	0 ug/m^3
Particulate Matter less than 10 microns in diameter (PM_{10})	24-Hour	150 µg/m³	0.489 µg/m^3	0.001 µg/m^3	1.456 µg/m^3	0 µg/m^3
	Annual	50 µg/m³	0.489 µg/m^3	0.001 µg/m^3	1.456 µg/m^3	0 µg/m^3
Particulate Matter less than 2.5 microns in diameter ($PM2_{.5}$)	24-hour	65 µg/m³	0.489 µg/m^3	0.001 µg/m^3	1.456 µg/m^3	0 µg/m^3
	Annual	15 µg/m³	0.489 µg/m^3	0.001 µg/m^3	1.456 µg/m^3	0 µg/m^3
Total Suspended Particulates (TSP)	24-hour	150 µg/m³	0.978 µg/m^3	0.002 µg/m^3	2.913 µg/m^3	0.001 µg/m^3
	Annual	60 µg/m³	0.978 µg/m^3	0.002 µg/m^3	2.913 µg/m^3	0.001 µg/m^3

Key:
NAAQS = National Ambient Air Quality Standards
ppm = parts per million
µg/m³ = micrograms per cubic meter

Operational - Under Alternative 1, there would be fewer T-38 air operations than in the Proposed Action; thus, aircraft emissions are slightly less than the Proposed Action. The emission levels would not exceed NAAQS. There would be no significant impacts to regional air quality from implementation of Alternative 1.

4.4.4 No Action Alternative

Under the No Action Alternative, there would be no change to current air quality, as the construction would not take place and no changes to aircraft operations would occur. Table 4–17 and Table 4–18 show the operational emissions expected from the aircraft currently operating at Tyndall AFB. No adverse impacts would occur under the No Action Alternative.

Table 4–17. No Action Alternative Air Emissions Compared to Bay County

Emission Activities	Emissions (tons/year)						
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2
Aircraft operations	1,100.13	308.00	80.12	80.12	39.93	152.27	162,352.18
Airspace emissions	0.01	0.26	0.02	0.02	0.01	0.00	20.76
Total [1]	**1,100.14**	**308.26**	**80.14**	**80.14**	**38.93**	**152.27**	**162,372.93**
Bay County Emissions	56,053.76	12,745.88	9,933.75	3,274.57	16,973.60	11,428.70	267.43 MT[2]
Percentage of County Emissions	1.96%	2.42%	0.81%	2.45%	0.23%	1.33%	0.06%

Notes:
[1] Column totals may not add up to the total listed due to rounding in the lines of data.
[2] This is the 10-year average CO_2 emission level for the state of Florida (1997-2007). There are no standards to determine significance of CO_2 emissions at this time. Information is provided to give context for the project emissions.

Key:
CO = Carbon Monoxide
CO_2 = Carbon Dioxide
MT = Million Tons
NOx = Nitrogen Dioxide
$PM_{2.5}$ = Particulate Matter less than 2.5 Microns in Diameter
PM_{10} = Particulate Matter less than 2.5 Microns in Diameter
SO_2 = Sulfur Dioxide
VOC = Volatile Organic Compounds

Table 4–18. No Action Alternative Air Emissions Compared to the NAAQS

Criteria Pollutant	Averaging Time	NAAQS (ppm)	Calculated Concentration (ppm)	
			Aircraft	Airspace
Carbon Monoxide (CO)	1-Hour	35	1.04755E-05	9.19529E-11
	8-Hour	9	7.33284E-06	6.4367E-11
Nitrogen Dioxide (NO_x)	Annual	0.053	2.67135E-08	2.26936E-11
Sulfur Dioxide (SO_2)	3-Hour	0.5	1.45846E-07	4.77146E-11
	24-Hour	0.14	6.48203E-08	2.12065E-11
	Annual	0.03	1.29641E-08	4.2413E-12
Particulate Matter less than 10 microns in diameter (PM_{10})	24-Hour	150 µg/m³	0.349 µg/m³	0 µg/m³
	Annual	50 µg/m³	0.07 µg/m³	0 µg/m³
Particulate Matter less than 2.5 microns in diameter ($PM2_{.5}$)	24-hour	65 µg/m³	0.349 µg/m³	0 µg/m³
	Annual	15 µg/m³	0.07 µg/m³	0 µg/m³
Total Suspended Particulates (TSP)	24-hour	150 µg/m³	0.699 µg/m³	0 µg/m³
	Annual	60 µg/m³	0.14 µg/m³	0 µg/m³

Key:
NAAQS = National Ambient Air Quality Standards ppm = parts per million µg/m³ = micrograms per cubic meter

4.5 Physical Resources

4.5.1 Methodology for Analysis

Soils - Minimization of soil erosion and the siting of facilities in relation to soil limitations is considered when evaluating impacts to soil resources. If a Proposed Action were to substantially affect (or be substantially affected by) any of these features, impacts would be considered significant. Generally, impacts associated with physical resources can be avoided or minimized to a level of insignificance if proper construction techniques, erosion control measures, and structural engineering designs are incorporated into project development.

Impacts on soils can result from earth disturbance that expose soil to wind or water erosion. Analysis of impacts on soils and surface water examines the potential for such erosion at each installation and describes typical measures employed to minimize erosion. In addition, soil limitations and associated typical engineering remedial measures are evaluated with respect to proposed construction. Soil resource impacts are not evaluated for the areas below the F-22 and T-38 primary use airspace since no ground-disturbing activities would occur at these locations.

Water Resources - Criteria for evaluating impacts related to water resources associated with the Proposed Action are water availability, water quality, and adherence to applicable regulations. Impacts are measured by the potential to reduce water availability to existing users, endanger public health or safety by creating or worsening health hazards or safety conditions, or violate laws or regulations adopted to protect or manage water resources. Land development changes the physical, chemical, and biological conditions of water resources. When land is developed, the hydrology (the natural cycle of water) can be altered. Impacts on hydrology can result from land clearing activities, disruption of the soil profile, loss of vegetation, introduction of pollutants, new impervious surfaces, and an increased rate or volume of runoff after major storm events. Without proper management controls, these actions can adversely impact the quality and/or quantity of water resources. The degree of impact considers the size of the affected area, the magnitude, and nature of change caused by both the Proposed Action and Alternative 1.

The primary concerns associated with the Proposed Action include effects on water quality during renovation and additions to existing facilities and construction of new facilities, impacts on surface waters, and changes to surface water drainage and ground water recharge. Flooding impacts are evaluated by determining whether proposed construction is located within a designated floodplain. Groundwater impacts are evaluated by determining whether groundwater beneath the project site would be used for the Proposed Action and, if so, to determine the potential to adversely affect those groundwater resources. Water resource impacts are not evaluated for the areas below the primary use airspace for the F-22 and T-38 since no ground-disturbing activities or use of water resources would occur at these locations.

USACE, FDEP, and NWFWMD are the regulatory agencies that govern water resources in the state of Florida and at Tyndall AFB. The CWA of 1977 regulates pollutant discharges and development activities that could affect aquatic life forms or human health and safety. As noted in Section 3.5.1, Section 404 of the CWA provides regulatory authority to the USACE for any actions involving discharge of dredge or fill materials in the waters of the U.S. Section 401 of the CWA gives individual states the authority to regulate any proposed federally permitted activity that may result in discharge to water bodies.

4.5.2 Proposed Action

Soils - Under the Proposed Action, up to approximately 8.12 acres (Table 4–19) of surface area could be temporarily disturbed due to construction, renovation, and additions to base facilities. Areas immediately surrounding construction zones may also experience temporary disturbance from vehicle and equipment operations during construction. Disturbance in areas greater than one acre require a Construction General Permit under the NPDES program.

Table 4–19. Soil Type and Potentially Disturbed Acres by Project

Project #	Project	Type	Acres	Soil
1	Hangar 1 (Building 182)	Renovation	N/A	Urban land
2	Squadron Operations (Building 164)	Renovation	N/A	Urban land
3	Hangar 2 (Building 180)	Renovation	N/A	Urban land
4	2 LO/CR Bays (Hangar 4-Building 280)	Renovation	N/A	Urban land
5	Repair MSA Roads	Renovation/ Repair	N/A	Arents
6	Expand Pavement at LOLA/LODA	New Construction	3.67	Arents
7	Re-Grade Existing Forestry Road for use as Alternate MSA Egress Route	Renovation/ Repair	1.93	Hurricane, Leon, Osier, Pickney, Rutlege
8	MRSP/Parts Store Addition (Building 266)	Addition	0.07	Urban land
9	Egress (Building 126)	Addition	0.05	Urban land
10	AME Storage (Building 107)	Addition	0.10	Arents
11	Deployment-Processing Center and Parking Area	New Construction	0.92	Leon sand
12	Covered MAC Pad, POV Parking, and New Roads	New Construction	0.40	Osier fine sand
13	LOLA Support Facility	New Construction	0.01	Arents
14	2 Munitions Storage Igloos	New Construction	0.55	Leon sand
15	4-Bay MX/Inspection Facility	New Construction	0.21	Arents
16	Inert Storage Area	New Construction	0.21	Arents
		Total	**8.12**	

Key:
AME = Alternate Mission Equipment
LO/CR = Low Observable/Composite Repair
LOLA/LODA = Live Ordnance Loading Area/Live Ordnance Departure Area
MAC = Munitions Assembly Conveyer
MRSP = Mobility Readiness Spare Package
MSA = Munitions Storage Area
MX = Maintenance
POV = Personally Owned Vehicle

Proposed renovation Projects 1 through 4 (Hangar 1, Building 182; Squadron Operations, Building 164; Hangar 2, Building 180; and 2 LO/CR Bays, Hangar 4-Building 280) and addition Projects 8 and 9 (MRSP, Building 266; and Egress, Building 126) would occur on previously developed areas of the installation (soil classification of Urban Land) (Figure 4-4). As such, these renovation activities and additions would not disturb or otherwise alter existing characteristics of the surrounding soil. The following projects would take place on Arents soil, which generally consists of altered land mixed by earth-moving or development activities (Arents soils have negligible surface runoff and are not prone to either flooding or ponding):

- Four of the new construction projects (Project 6, Expand Pavement at LOLA/LODA; Project 13, LOLA support facility; Project 15, bay MX/inspection facility; and Project 16, inert storage area),
- Two of the renovation projects (Project 5, repair munitions storage area roads and Project 6, repair pavements at LOLA/LODA), and
- Project 10, Alternate Mission Equipment (AME) storage, Building 107.

The proposed new construction of the deployment-processing center and parking area (Project 11) and part of the MSA igloo construction (Project 14) would occur on Leon and Mandarin sands. Both sands have limitations for development due to high acidity, proximity to the water table, high surface runoff potential (Leon sand only), susceptibility to wind erosion, and a tendency for excavated walls to become unstable.

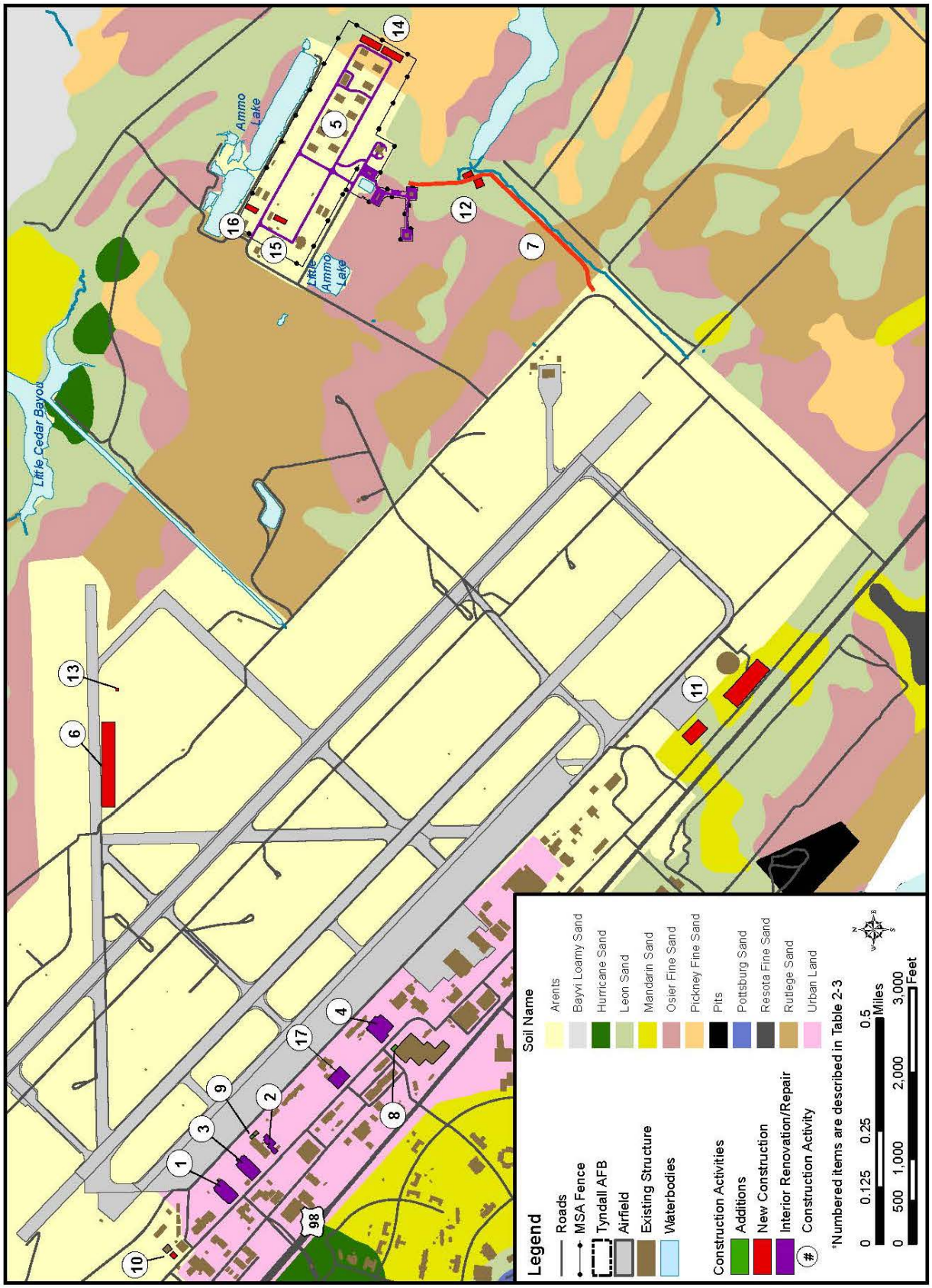

Figure 4–4. Soil Types in Industrial Areas of Tyndall AFB – Proposed Action

A small portion of the proposed construction of the MSA igloo (Project 14) would occur in areas with Pickney sand, which has limitations for development due to high acidity, proximity to the water table, tendency to flood, susceptibility to wind erosion, and a tendency for excavated walls to become unstable.

Proposed construction Project 12 (covered MAC pad, POV parking, and new roads) would occur in Osier sand, which has limitations for development due to high acidity, proximity to the water table, tendency to pond, susceptibility to wind erosion, and a tendency for excavated walls to become unstable. Figure 4–4 shows soil types in the area of the Proposed Action.

In addition to the Leon, Osier, and Pickney sands as described above, Project 7 (re-grade existing forestry road for use as an alternate MSA Egress route), would also take place on Hurricane and Rutlege soils. Both of these soils have limitations for development due to high acidity, proximity to the water table, tendency to flood, susceptibility to wind erosion, and a tendency for excavated walls to become unstable.

Construction practices to lessen potential impacts to soils resulting from the Proposed Action could include but are not be limited to the following:

- Use of reinforcement structures for any construction involving excavation to prevent collapse of excavated walls.
- Frequently spray water on exposed soil during construction to keep soil from becoming airborne (especially with soils susceptible to wind erosion).
- New road construction or re-grading should employ measures including, but not limited to the following:
  - Stabilize areas of bare soil to reduce erosion (restore vegetative cover, mulch, and seed if possible) and
  - Install and or/maintain road erosion control devices.
- Avoidance of uncoated steel and concrete being directly exposed to soils due to acidity and potential for corrosion.
- Installation of silt fencing and sediment traps.
- Proper soil stockpiling methods (if dig and/or fill methods are used in construction).
- Revegetation of any disturbed areas as soon as possible, as appropriate.

By following standard construction practices, potential impacts to soil resources would be minimal and no significant impacts would occur due to implementation of the Proposed Action.

The Proposed Action would result in no changes to existing geologic or topographic conditions on the Tyndall AFB. Therefore, potential impacts to earth resources would be minimal and no significant impacts would occur due to implementation of the Proposed Action.

Water Resources - Water resources in the proximity of construction and renovation areas of the Proposed Action are shown in Figure 4–5. Section 4.8 discusses floodplains and potential impacts to floodplains.

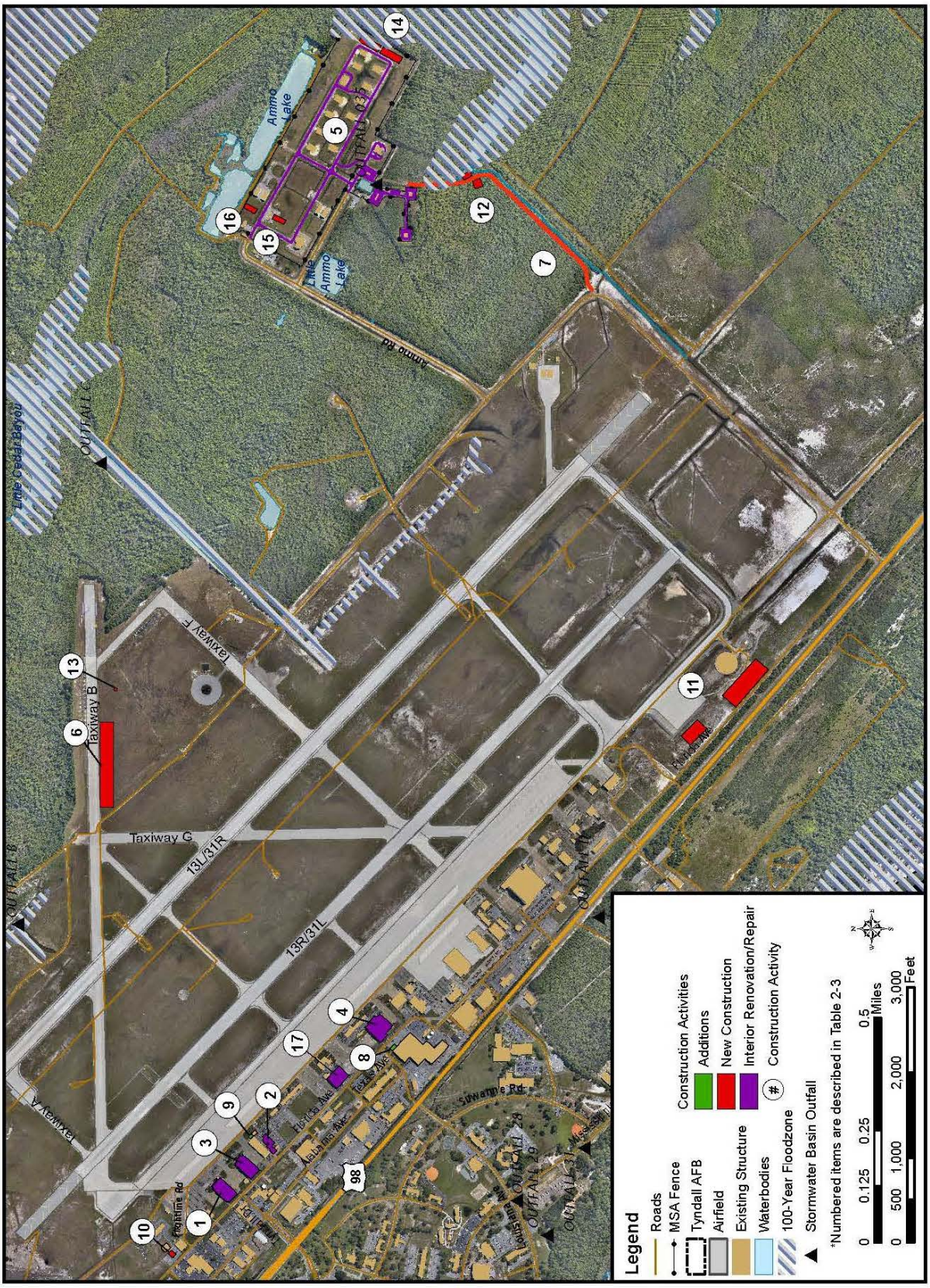

Figure 4–5. Outfall Areas and Water Resources in Industrial Areas of Tyndall AFB – Proposed Action

Surface Water - Under the Proposed Action, new facility construction and additions to current facilities at Tyndall AFB would result in a net increase of 8.12 acres of impervious surface (Table 4–20), which represents an increase of less than 1 percent of total developed base area in impervious surface. This increase in impervious surface would result in a minor, comparatively negligible increase in stormwater runoff in the developed area of Tyndall AFB. Big Ammo Pond, a freshwater lake used for recreation with access restricted to DoD personnel, is located in the northeast portion of the industrial area and is near Projects 5, 14, 15, and 16.

Table 4–20. New Acres of Impervious Surface by Project

Project #	Project	Type	Acres	Outfall
6	Expand Pavement at LOLA/LODA	New Construction	3.67	C
7	Alternate MSA Egress Route Extension	New Construction	1.93	C
8	MRSP/Parts Store Addition (Building 266)	Addition	0.09	D
9	Egress (Building 126)	Addition	0.05	D
10	AME Storage (Building 107)	Addition	0.07	D
11	Deployment-Processing Center and Parking Area	New Construction	0.88	D
12	Covered MAC Pad, POV Parking, and New Roads	New Construction	0.23	C
13	LOLA Support Facility	New Construction	0.02	B
14	2 Munitions Storage Igloos	New Construction	0.55	C
15	4-Bay MX/Inspection Facility	New Construction	0.21	C
16	Inert Storage Area	New Construction	0.21	C
		Total	**8.12**	

Key:
AME = Alternate Mission Equipment
LO/CR = Low Observable/Composite Repair
LOLA/LODA = Live Ordnance Loading Area/Live Ordnance Departure Area
MAC = Munitions Assembly Conveyer
MRSP = Mobility Readiness Spare Package
MSA = Munitions Storage Area
MX = Maintenance
POV = Personally Owned Vehicle

Prior to construction, the base would be required to obtain coverage under a NPDES Construction General Stormwater Permit by 1) filing a Notice of Intent (NOI) for the construction activity and 2) consulting and utilizing guidelines established by the base SWPPP to manage stormwater associated with the construction activity. Both of which would require information from the construction contractor who may prepare a SWPPP with review and approval by the base. As directed by the SWPPP, standard construction practices must be employed to minimize the potential for exposed soils or other contaminants from reaching surface waters during or following construction activities associated with the Proposed Action. Such standard construction practices would include the use of silt fences, covering of soil stockpiles, use of secondary containment for the temporary storage of hazardous liquids, establishment of buffer areas near intermittent streams, and revegetation of disturbed soils that would not be paved or covered by structures in a timely manner. In addition, projects associated with the Proposed Action involving the disturbance of more than 5,000 square feet (0.1 acres) would be required to employ measures necessary to adhere to Section 438 of the EISA. Adherence to the requirements of the NPDES construction permit, the SWPPP, and Section 438 of the EISA would minimize impacts to water resources during construction, resulting in a minor impact.

As part of ongoing engine-maintenance activities for the T-38, Tyndall AFB would conduct aircraft engine cleaning by introducing a soap solution through the running engine. This activity would take place over an existing wash rack and be conducted in accordance with the Tyndall AFB SWPPP and other state and federal regulations.

Groundwater - Since Tyndall AFB purchases most of its drinking water from Bay County by way of Deer Point Reservoir, no impacts are likely from the Proposed Action. Impacts from the Proposed Action to the underlying Florida Aquifer and to well water that is accessed on the base would be negligible and no activities would have the potential to affect the quality or recharge capabilities of the aquifer. Further, any additional surface water generated by the Proposed Action would be well within the capacity of the existing stormwater system and would be appropriately treated before entering the stormwater systems, as per the base SWPPP. Therefore, no significant impacts to soils or water resources are anticipated with the implementation of standard construction practices.

4.5.3 Alternative 1

Potential impacts to soil and water resources from Alternative 1 would be the same as those described for the Proposed Action. Soil types and water resource conditions of the areas potentially disturbed in Alternative 1 would be the same as the Proposed Action and as such, the standard construction practices would apply. Adherence to the requirements of the NPDES construction permit, the SWPPP, and Section 438 of the EISA would minimize impacts to water resources during construction, resulting in a minor impact. Therefore, no significant impacts are anticipated.

4.5.4 No Action Alternative

Under the No Action Alternative, none of the proposed construction, repair, or renovation activities associated with the beddown of F-22 and T-38 at Tyndall AFB would occur. There would be no new impacts to physical resources. Conditions would remain as described in Section 3.5.

4.6 Biological Resources

4.6.1 Methodology for Analysis

The analyses included an assessment of the impacts on biological resources resulting from both construction activities and daily aircraft operations. The locations of known sensitive habitats and species in relation to the Proposed Action and Alternative 1 were identified utilizing existing available GIS data and areas of overlap were examined to determine a potential for impact. Scientific literature was reviewed for studies that examined similar types of impacts to biological resources. The literature review included an evaluation of basic characteristics and habitat requirements of each sensitive species. The Air Force gathered available information on management considerations, incompatible resource management activities, and threats to each sensitive species, then conducted analyses based on the information gathered and discussions with experts in these areas.

The Air Force based their determination of significant impact on whether or not the Proposed Action or Alternative 1 would jeopardize the continued existence of a protected species, which is the USFWS criterion (USFWS 2010). Impacts to biological resources would be considered significant if species or habitats of concern were adversely affected over relatively large areas of their range or if disturbances reduce population size or distribution. Direct and indirect

impacts to the species and its habitat are included in the analysis. Additionally, impacts to non-protected wildlife species would be considered significant if impacts were on such a scale as to place the species on a candidate, threatened, or endangered species list.

Potential impacts to marine biological resources are analyzed according to the type of effect rather than by resource category since a given effect may influence multiple resources. The categories of potential effects include noise, water quality alteration, residual materials, direct physical impacts, and construction. Table 4–21 shows the marine biological resources discussed for each effect. Potential impacts to critical habitat designated under the ESA are discussed at the end of this section.

Table 4–21. Marine Biological Resources Potentially Affected by the Proposed Action

Marine Biological Resource	Type of Effect				
	Noise	Water Quality Alteration*	Residual Materials*	Direct Physical Impacts	Construction
Plankton		●			●
Invertebrates		●			●
Hardbottom Areas			●		
Special Biological Resource Areas			●		
Seagrass		●			●
Birds	●	●		●	
Fish		●			●
Essential Fish Habitat		●			●
Marine Mammals	●	●		●	
Sea Turtles	●	●		●	●

Note: *Water quality alteration refers to potential changes in water chemistry, whereas residual materials refers to objects placed into the water

4.6.2 Proposed Action

4.6.2.1 Terrestrial Biological Resources

Wildlife and Vegetation

Construction - Implementation of the Proposed Action would have minimal effects on wildlife and vegetation at Tyndall AFB. Of the total project footprint (353,615 square feet (SF), or 8.12 acres), the Proposed Action would result in developing approximately 5.79 acres of new facility space on lands already defined as developed military areas (Air Force 2006). Developed military areas are defined as previously disturbed locations characterized by landscaped areas in and among buildings, roads, and parking areas. Approximately 2.33 acres of new facility and road construction would occur within vegetative communities (i.e., mesic/wet slash flatwoods and slash, longleaf, and sand pine plantations), which may contain wetlands and are discussed in the Wetlands section below.

Construction would displace wildlife species such as small mammals and birds that inhabit the construction areas; however, the size of the disturbance zone and proximity to adjacent similar and higher quality habitat would likely displace wildlife species from the immediate area. New building construction should be properly sealed to prevent animals such as bats from entering. Noise from construction activities, increased traffic, and earth-moving activities could potentially temporarily disturb wildlife near the construction areas. This disturbance is expected to be short-term and minor given the existing noise environment adjacent to an active

airfield. No significant impacts to wildlife and vegetation from construction activities would occur under the Proposed Action.

Air Operations - The total on-base land area impacted by the projected noise contours would increase by approximately 973 acres from the baseline. The primary issue of concern for wildlife from air operations is noise, especially for bird species. Most commonly, the reaction of birds and wildlife to aircraft noise, particularly when the aircraft is visible to the animal is some degree of startle response such as flushing (i.e., abruptly leaving a nest) (Manci *et al*. 1998). In this case, an animal could theoretically leave its nest open to predation, thereby affecting reproductive success (Larkin 1996).

Aircraft are already a major component of the existing noise environment at Tyndall AFB. Wildlife that continue to live near airfields are likely accustomed to the types of noise and vibration disturbances produced by missions and are not deterred by the disturbance as long as the habitat is suitable. Wildlife species including black bears, bald eagles, and migratory birds inhabiting area under noise contours associated with the base have likely habituated to aircraft noise, which has been part of the existing environment for 60 years (Air Force 2007). As discussed in the Wildlife and Vegetation Air Operations section, aircraft noise from the Proposed Action would not be expected to pose a threat to birds and wildlife (including threatened, endangered, and special status species/communities), other than possibly causing the wildlife to flee the area temporarily. Even though noise is projected to be louder and cover more area, wildlife and migratory birds have thrived in areas with loud noise environments at Tyndall AFB, as suitable habitat appears to have outweighed any negative influences associated with noise. Therefore, the proposed changes in noise levels are not expected significantly impact wildlife species.

Bald Eagle - There are five known bald eagle nests within approximately one mile of the airfield. The eagles apparently tolerate current noise levels. Average noise increases from the addition of new aircraft would not be abruptly noticeable as flights of this new aircraft are integrated with other aircraft that currently use this runway on a day-to-day basis. Changes in flight patterns such as lower altitude or routes closer to the nests would be more likely to have an effect; however, such changes are not foreseen. In one study, bald eagle response was primarily related to the proximity of a disturbance such as a person or aircraft rather than to a particular noise (Larkin 1996); in effect, eagle response was related to a visual presence.

Tyndall AFB would observe the restrictions detailed in the *National Bald Eagle Management Guidelines* (USFWS 2007). As pertains to aircraft activities, the guidelines state that aircraft should not operate within 1,000 feet of bald eagle nests during the breeding season (1 October to 15 May), except where eagles have demonstrated a tolerance for the activity. Eagles at Tyndall AFB are exposed to aircraft noise daily and appear to have adjusted to the noise levels near the airfield. Thus, impacts to the bald eagle would not be significant.

Southeastern American Kestrel - Kestrels are a type of raptor or predatory bird. Research on noise and predatory birds indicates these types of birds are less likely to startle or flush than other types of birds such as songbirds. Low response to aircraft noise was observed in nesting ospreys (Trimper *et al*. 1998). Red-tailed hawks exhibited habituation to helicopter noise (Andersen *et al*. 1989). In general, Manci *et al*. (1998) found that most raptors did not exhibit a

negative response to low-level overflights. Based on these observations, impacts to the Southeastern American kestrel from F-22 and T-38 aircraft noise would not be significant.

Migratory Birds - Noise levels from F-22 and T-38 aircraft have the potential to disturb migratory birds. Since flight training is considered a military readiness activity, the "take" of migratory birds in the course of this training would be allowed. Noise increases would be gradual, allowing birds to acclimate to the noise. Impacts should be minimal based on results from the study *Distribution of Neararctic-Neotropical Migrant and Resident Bird Species among Habitats at Eglin and Tyndall Air Force Bases, Florida* (Tucker *et al*. 1996), which states that Tyndall AFB is not an important stopover site for neotropical migrants during the spring or fall.

Tucker *et al*. (1996) found that both migratory and resident bird species prefer hammock, riparian, flatwoods, and barrier island habitats. In support of migratory birds and other sensitive species, Tyndall AFB will continue to maintain its hammock, riparian, flatwoods, and barrier island habitats in good condition; this would be the most important factor to the continued health of the bird communities in the area. Migratory and resident birds have thrived at Tyndall AFB in areas with loud noise environments; suitable habitat appears to have outweighed any negative influences associated with noise. Thus, F-22 and T-38 air operations would not have a significant impact on migratory birds.

Florida Black Bear - Black bears use the thick swamps, flatwoods, sands pine scrub, and forested habitats on Tyndall AFB. Exposure to low-level aircraft noise is already occurring. Given the wide distribution of the black bear on Tyndall AFB, the presence of suitable habitat appears to have outweighed any negative influences associated with noise. Thus, impacts to the black bear from F-22 and T-38 aircraft noise would not be significant.

Alligator Snapping Turtle, American Alligator, Florida Pine Snake, Gopher Tortoise, and Gulf Salt Marsh Snake – F-22 and T-38 aircraft would fly over the habitat for multiple sensitive reptiles and amphibians so there is the potential for noise impacts. Few studies have been conducted on noise impacts to amphibians and reptiles. Some reptiles and amphibians exhibit a response to low frequency impulse noise and may experience a temporary decrease in hearing sensitivity after prolonged exposure to 95 dB (Manci *et al.* 1998). Overall, reptiles and amphibians have relatively poor hearing and depend more on vibrations to interpret surrounding activities, such as approaching predators and prey (Bowles *et al*. 1999). The five sensitive amphibian and reptile species mentioned above, as well as the Eastern indigo snake, flatwoods salamander, and gopher frog (although not historically present at Tyndall AFB), typically are associated with some type of burrow or live underwater, which would provide some protection from loud noise. Thus, impacts to these amphibian and reptile species would not be significant.

F-22 aircraft could operate as low as 500 feet AGL (he lowest altitude the Air Force allows the F-22 to operate), but in the Tyndall MOAs would spend 75 percent of their time operating above 10,000 MSL. Approximately 0.5 percent of the F-22 flight hours would occur between 500 and 2,000 feet AGL. The T-38 would primarily operate between 5,000 feet AGL and 35,000 feet MSL, rarely flying below 5,000 feet AGL.

Any species present under the Tyndall MOA flight paths may be exposed to sound exposure levels up to 116 dB from the F-22 and 109 dB from the T-38 flights at 500 feet AGL (Table 3–6).

The loudest overflight event currently occurring regularly under Tyndall MOAs is 116 dB SEL at 300 feet AGL, as generated by F-15 aircraft (Section 3.2, Table 3–6).

Wildlife and birds living near airfields and under established flight paths are likely accustomed to the types of noise and vibration disturbances produced by aircraft and the presence of suitable habitat appears to outweigh the disturbance of loud noises and vibrations. While F-22 and T-38 aircraft operations would increase the noise and activity levels at the airfields and along existing flight paths, it is expected that birds and wildlife would acclimate to the noise. Bird species may exhibit an initial and temporary flight response until they become accustomed to the increased noise levels. Overall, F-22 and T-38 flight operations are not likely to significantly impact any wildlife species.

Management Actions – Restricting low-level aircraft flights within 1,000 feet (vertically) of bald eagle nests during the breeding season (1 October to 15 May) would minimize impacts to sensitive species from air operations.

Threatened, Endangered, and Special Status Species/Communities

Construction - Currently, no federal or state listed plant or animal species have been documented in the proposed construction areas; however, vegetative communities in some of these areas have the potential to support several state-sensitive and one federally listed plant species (Table 3–15). Surveys have been conducted within the proposed construction areas and no threatened or endangered species were found. Therefore, no significant impacts to threatened or endangered species are expected to occur and Section 7 consultation with USFWS would not be required.

High priority habitat for the Gulf salt marsh snake, a federal species of concern, lies adjacent to the construction area for the MAC pad, POV parking, and the extension to the alternate MSA egress route (Figure 4–6. Biological Resources near the Proposed Action) (Tyndall AFB 2006). Gulf salt marsh snake is vulnerable to habitat destruction and degradation. Construction areas and activities near salt marsh snake habitat should protect habitat from drainage and pollution. Pollution either may directly or indirectly impact the species by accumulating as toxins in the tissues of its prey. Implementation of the standard construction practices discussed in the Wetlands section below would minimize potential indirect impacts to the salt marsh snake and its habitat. Therefore, significant impacts are not expected to the Gulf salt marsh snake and its habitat.

Several Florida black bear sightings have occurred in the MSA area (Jones 2011). Possible impacts are associated with the potential for increased human–bear interaction. Increases in human activity in the area (food, garbage, etc.) could lead to increased interactions with bears. It is important for personnel to handle waste responsibly and employ measures such as bear-proof dumpsters and bear-resistant garbage cans. The Tyndall AFB Natural Resource Element holds an FWC permit to trap and relocate black bears. Implementation of the Proposed Action would not impact the Florida black bear significantly.

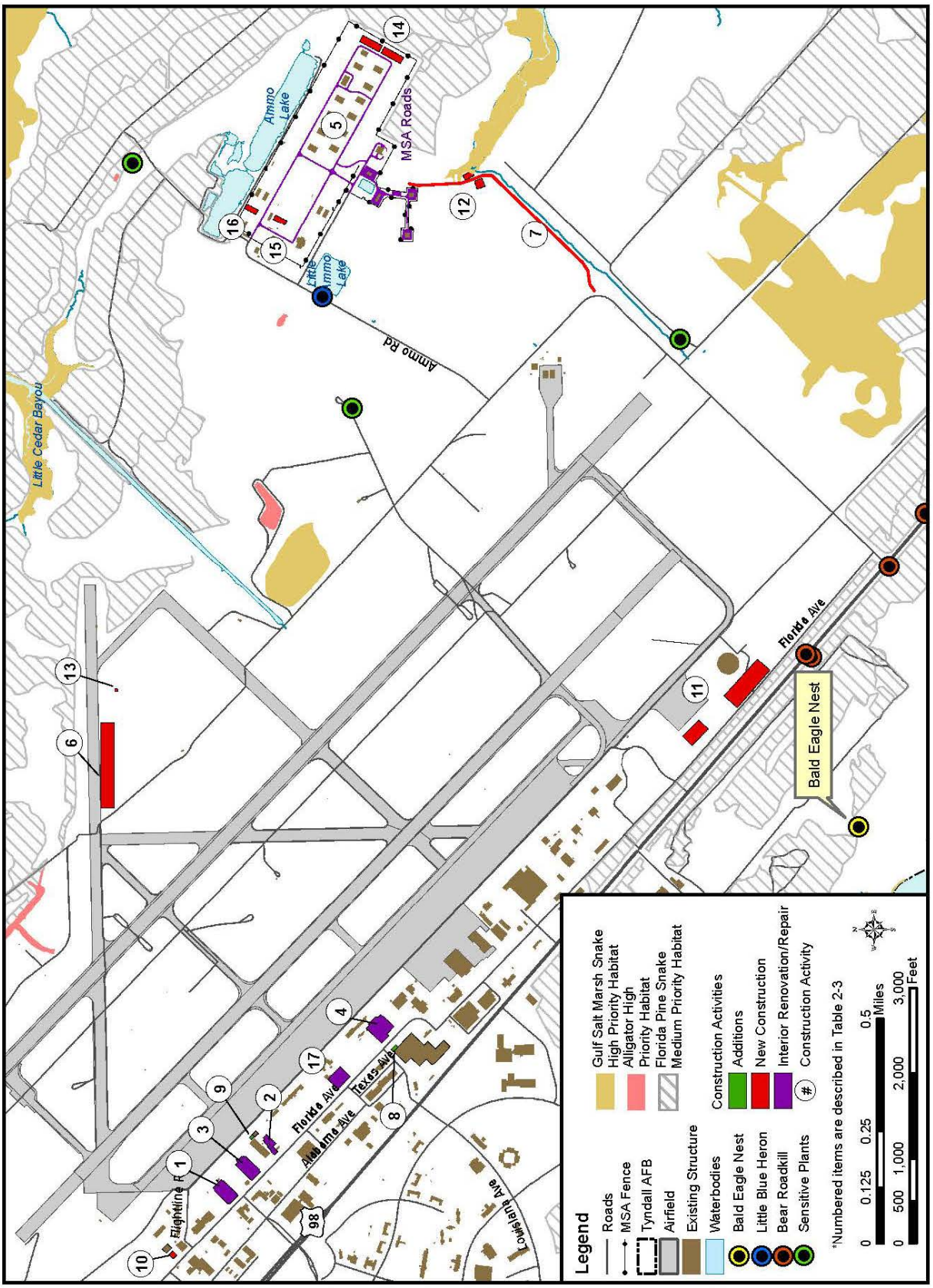

Figure 4–6. Biological Resources near the Proposed Action

Air Operations - As discussed in the Wildlife and Vegetation Air Operations section, aircraft noise from the Proposed Action would not be expected to pose a threat to birds and wildlife (including threatened, endangered, and special status species/communities) other than possibly causing the wildlife to flee the area temporarily. The proposed changes in noise levels would not be significantly different from baseline conditions and are not expected to significantly impact any threatened or endangered species populations.

Wetlands

Construction - New facility and road construction would directly impact about 0.63 acres of palustrine wetlands (Table 4–22 and Figure 4–7) as defined by the USFWS NWI. Wetlands in the construction area have not been delineated yet in accordance with USACE 1987, *Wetlands Delineation Manual*. Prior to any ground-disturbing activities, a jurisdictional delineation from the USACE would be performed for sited construction projects (Air Force 2006).

Table 4–22. Acres of Wetlands Impacted by New Construction under the Proposed Action

Map ID	Facility Name	Acres of Wetlands Impacted	National Wetland Inventory (NWI) Wetland Type
14	Munitions Storage Area (MSA) Igloo	0.03	Freshwater Emergent
7	New Roads	0.60	Freshwater Forested/Shrub
	Total	**0.63**	

Source: USFWS 2010

If jurisdictional wetlands were identified in any of the construction areas, a CWA Section 404 permit through USACE for discharges to waters of the U.S. would be required. Impacts to wetlands must also be coordinated with FDEP and NWFWMD including any specific agency required delineations and management actions.

In coordination with FDEP and NWFWMD, Tyndall AFB would replace the loss of any wetlands with new, same quality wetlands construction or restoration in a suitable location on the base. A formal plan to replace the loss of wetlands would be developed during final design and application for a Section 404 permit made to the USACE. Due to safety requirements dictating an alternate egress route from the MSA and an operational requirement to locate the MAC pad in close proximity to the MSA, there are no practicable siting alternatives which would avoid wetlands. In accordance with EO 11990, the Air Force has prepared a Finding of No Practicable Alternative (FONPA). Therefore, since Tyndall AFB would replace disturbed wetlands with same quality wetlands there would be no net loss in wetlands and impacts to wetlands would not be significant.

Secondary impacts to wetlands from sedimentation have the potential to occur during construction activities within/near wetlands and from increased stormwater runoff due to new impervious surfaces; however, sedimentation is not permitted in wetlands and could result in a Notice of Violation.

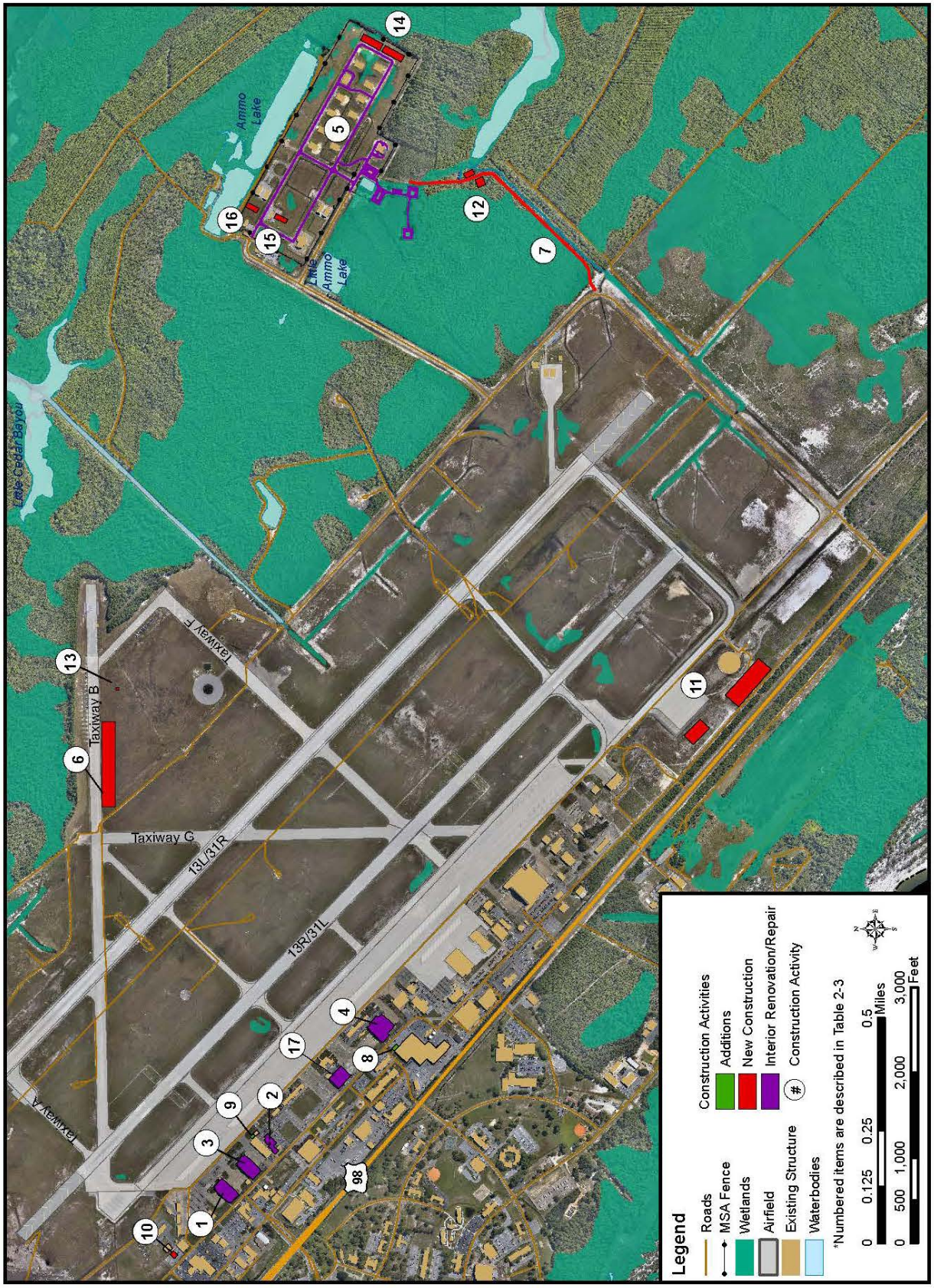

Figure 4–7. Wetlands Located near New Construction under the Proposed Action

Stormwater impacts are discussed in the Physical Resources (Section 4.5). In accordance with the FDEP and the Northwest Florida Water Management District (NWFWMD) Environmental Resource Permit Applicant's Handbook (FDEP and NWFWMD 2010) a minimum buffer of 15 feet and an average buffer of 25 feet should be maintained between upland activities and adjacent wetlands. Impact to wetlands would not be considered adverse if these buffers remain undisturbed, except for drainage features such as spreader swales and discharge structures, provided the construction or use of these features does not adversely impact wetlands. Additionally, the guidance states that wetlands or other surface waters shall not be filled to achieve this buffer requirement. In areas where it is authorized for wetlands or other surface waters to be filled, an undisturbed upland buffer would not be required (FDEP and NWFWMD 2010).

To minimize the potential for secondary impacts to wetlands, Tyndall AFB would employ the following standard construction practices:

- Install and maintain entrenched silt fencing along the perimeter of the construction site prior to any ground-disturbing activities and maintain them in effective, operating condition prior to, during, and throughout the entire construction process to prevent fill material, pollutants, and runoff from entering wetlands or other surface waters.
- Incorporate a monitoring plan, especially after rain events, to observe the effectiveness of silt fencing and/or other erosion and sedimentation control devices and address modification as needed. Any failures would be carefully examined and corrected to prevent reoccurrence.
- Sequence construction activities to limit the soil exposure for long periods.
- Vegetate cleared/disturbed areas with native vegetation and grasses or mulch when the final grade is established to reduce/prevent erosion.
- Where applicable, reduce erosion using rough grade slopes or terrace slopes.
- Identify areas of existing vegetation that the proponent would retain and not disturb with the construction activities.
- Store chemicals, cements, solvents, paints, or other potential water pollutants in locations where they cannot cause runoff pollution.
- Repair, maintain, and operate construction equipment (i.e., cement mixers) in designated "staging areas" designed to contain any chemicals, solvents, or toxins from entering surface waters.
- Stabilize construction site entrance using Florida Department of Transportation (FDOT)-approved stone and geotextile (fiber fabric).
- Incorporate 10-year storm events into the design of facilities. Design must be constructed to EISA Section 438 (*Storm water runoff requirements for Federal development projects*) standards.
- Do not utilize septic tanks.
- Equip work sites with adequate waste disposal receptacles for liquid, solid, and hazardous wastes to prevent construction and demolition debris from leaving the work site.

- Utilize proper site planning, low-impact design principles, and adequately engineered stormwater retention ponds (or swales) to manage stormwater (on-site) and prevent discharges into nearby surface waters. The design would take into consideration the landscape of the area and physical features to determine whether a retention pond or series of swales would be used to contain runoff. In accordance with FDEP regulations, a Florida-registered Professional Engineer would design the proposed retention feature.
- Incorporate into the design and construction of paved surface areas a slope that would be sufficient to direct potential runoff away from wetland areas. Design and construct all drainage improvements and related infrastructure in such a manner that the natural hydrologic conditions would not be severely altered. Design project to EISA Section 438 *Low Impact Design* standards. Design and construct all drainage improvements and related infrastructure in such a manner that the predevelopment natural hydrologic conditions of the property would be maintained or restored to the maximum extent technically feasible with regard to temperature, rate, volume, and duration of flow.
- Do not use wetlands and other water bodies as sediment traps.
- Design open channels and outfall ditches to include plans so that they do not overflow their banks.
- Where flow velocities exceed 2 cubic feet per second, provide ditch pavement or other permanent protection against scouring. Revegetate all ditches not protected with a permanent material to provide an erosion resistant embankment. Coordinate with the bases' Natural Resources Element prior to bringing revegetation material on base.
- Treat runoff from parking lots to remove oil and sediment before it enters receiving waters. Design project to EISA Section 438 *Low Impact Design* standards.
- Provide all construction personnel with proper training regarding all management techniques.

4.6.2.2 Marine Biological Resources

Potential impacts to marine biological resources may result from noise, water quality alteration, residual materials, direct physical impacts, and construction. Each of these is discussed in relation to biological resources.

Subsonic Noise - Noise produced during F-22 and T-38 flights can potentially impact marine species near the shoreline, at or near the water surface, or in the air. Impacts may result from subsonic or supersonic noise. Overwater flights associated with the Proposed Action would occur within warning areas scheduled by Eglin AFB and Tyndall AFB, which comprise the Eglin Gulf Test and Training Range (EGTTR). In 2002, Eglin AFB evaluated the noise effects on marine species of approximately 39,000 sorties per year throughout the EGTTR, including subsonic and supersonic noise, through a Programmatic Environmental Assessment (PEA) (Air Force 2002). The assessment included flights originating at Tyndall AFB. Subsonic events were evaluated using an A-weighted scale and supersonic events were measured using a C-weighted scale. The A-weighted scale places greater emphasis on those frequencies best heard by the human ear. The C-weighted scale gives nearly equal weight to most frequencies and better reflects low frequency sounds associated with impulsive noise events. The F-22 has more powerful engines than the T-38 and is potentially louder; therefore, possible noise impacts to marine resources focuses on noise produced by the F-22. Maximum noise levels resulting from

subsonic flight (70 percent power and airspeed of 450 knots) for the F-22 have been estimated, as discussed in Section 3.2, and are shown in Table 4–23. These values would represent the noise level at the water surface and would be substantially lower with increasing depth. Ambient background noise is typically estimated to have an average sound level of 35 to 40 dB; therefore, aircraft noise values below 35 are considered inconsequential over time.

Table 4–23. Sound Exposure Level (SEL) under the Flight Track (Subsonic) for F-22 Aircraft

Altitude in Feet	500 Above Ground Level (AGL)	1,000 AGL	2,000 AGL	5,000 AGL	10,000 AGL	30,000 AGL
F-22	116	111	105	95	86	68
T-38	109	104	97	86	76	56

Animal response to aircraft noise is influenced by many variables such as aircraft size, speed, proximity, and engine noise level, among others. Generally, noise effects may include physiological damage such as rupture of the eardrum, shift in the hearing threshold, auditory masking, and stress responses, as well as behavioral modifications (Manci *et al*. 1998). Subsonic flights would not produce noise intensities great enough to cause physiological damage, but could result in stress and behavioral responses. Species potentially affected by subsonic noise includes marine mammals at or near the surface, nesting or surfaced sea turtles, and birds.

Marine mammals could experience stress responses when exposed to aircraft overflights and potentially vacate or avoid areas of persistent noise; however, aircraft noise would be mobile and transient and would not persist in any given area. In addition, only animals at or near the surface at the time of an overflight would be affected. Flights occurring at higher altitude would transmit less noise toward the water surface. F-22 aircraft would operate above 30,000 feet 75 percent of the time and would operate above 10,000 feet 95 percent of the time so habitat displacement would therefore be unlikely. The *Final Environmental Impact Statement, Initial F-22 Operational Wing Beddown* (Air Force 2001) provides a summary of relevant literature related to noise effects on marine mammals. Gray whales and harbor porpoises have shown no obvious reaction to aircraft overflights. Bottlenose dolphins have similarly showed no response to helicopter or survey aircraft overflights, unless the aircraft's shadow passed over the animal. Noise reflection and attenuation between the air and water interface likely account for part of the lack of response.

Most aircraft noise is transmitted into the water within a narrow band centered on the flight path where a large portion of the sound is reflected so it does not enter the water column (Air Force 2011). Much of the acoustic energy that is encountering the water surface at angles greater than 13 degrees from vertical is being reflected (Sparrow 1998). The relatively small portion of sound that does enter the water column may be transmitted away from the source and could be heard by an animal at or near the surface. Exposure to noise from aircraft overflight would be brief and would diminish rapidly due to the speed of the aircraft. Blackwell and Greene (2002) examined overflights of F-15 aircraft at Elmendorf AFB (where the end of the runway is close to the shore) and found that the noise of a landing aircraft exceeded the ambient underwater noise level (124 dB re 1 μPa) for only three seconds. In addition, underwater noise during landing approaches was detectable in only two of 11 overflights. It should be noted that the ambient underwater noise level near Elmendorf AFB is not necessarily indicative of levels at other locations, and that F-22 engines are more powerful (and therefore

potentially louder) than those on F-15 aircraft. It is not expected that noise resulting from subsonic flight would significantly affect marine species.

There is a stable population of bottlenose dolphins in St. Andrews Bay adjacent to Tyndall AFB, and it is presumably subject to frequent aircraft noise (Bouveroux and Mallefet 2010). Manatees appear to be relatively unresponsive to manmade noise (Bowles *et al*. 2004), and can apparently habituate to such noise. In addition, manatees spend a substantial percentage of their time underwater. In essence, although marine mammals may detect and respond to noise from subsonic flights, most of the effects are mild enough that they are not detectable as changes in population structure (Air Force 2001).

Sea turtles may perceive aircraft noise and could exhibit reactions similar to marine mammals (stress or behavioral responses); however, they spend greater than 90 percent of their time submerged (Byles 1988; Renaud and Carpenter 1994) and instances of surfacing during an overflight would be infrequent. Aircraft noise does not appear to result in displacement of turtles as they occur adjacent to Tyndall AFB in St. Andrews Bay and in nearshore Gulf of Mexico waters. Nesting sea turtles could be exposed to subsonic flight noise; however, since the nesting presently occurs in an existing environment with aircraft noise, it is not anticipated that additional subsonic noise produced by the F-22 or T-38 aircraft would affect sea turtle nesting efforts or success. The number of documented loggerhead turtle nests on Tyndall AFB beaches before and after the initial F-22 conversion does not clearly indicate whether there was a change based on the aircraft's arrival. Sea turtle nesting activity is influenced by a number of factors such as weather and erosion patterns, coastal development, and fishing practices. The general nesting trend at Tyndall over the past decade is similar to that found throughout the Florida panhandle (FWRI 2011). The number of daytime and nighttime aircraft operations under the Proposed Action compared to baseline conditions would decrease. Noise contours (Section 3.2) show that single-event noise levels along the beachfront associated with the Proposed Action would not differ appreciably from baseline levels. Therefore, there would be no significant impacts to sea turtles resulting from subsonic flights.

A summary of literature reports of the effects of aircraft noise on wading birds, shorebirds, and other aquatic birds is provided in Air Force (2001) and Manci *et al*. (1998). A study on the effects of low-altitude flight (sound levels of 55 to 100 dBA) on a colony of mixed wading bird species found that reproductive activity, nestling survival, and nestling chronology were independent of overflights. Another study evaluated the effects of circling flights of fixed- and rotary-wing aircraft. Ninety percent of birds exhibited little to no observable reaction. Various studies of aircraft noise effects on shorebirds generally present similar conclusions. There were no observable impacts to least terns resulting from rocket launches and pre-launch security overflights near Vandenberg AFB in California. Snowy plovers were more prone to flush during launches and pre-launch flights, but impacts to long-term habitat use and nesting success were not detected. A study of herring gulls near J. F. Kennedy International Airport concluded that subsonic flights resulted in no behavioral effects. Wading birds in south Florida what were exposed to noise from overflights of helicopters and fixed-wing aircraft exhibited little response and all birds that left the nest returned within five minutes. Black *et al*. (1984) studied wading bird colonies in Florida that were exposed to low-level military aircraft overflights, and reported no demonstrated effect on colony establishment or size. Colony distribution was random with respect to military areas.

Coastal and marine bird species, including the federally listed piping plover, would be exposed to aircraft noise during subsonic flights near the shoreline and on the water or in the air of the offshore airspaces. Depending on the perceived noise level and other factors, birds may experience a stress response or exhibit a behavioral reaction. Based on the studies summarized above, it is not likely that birds would abandon their habitat or that breeding success or their population numbers would be negatively affected. There would be no significant impacts to shorebirds or to the listed piping plover resulting from subsonic flights from the implementation of the Proposed Action.

Supersonic Noise - Supersonic flights produce shock waves. The noise associated with such waves is known as a sonic boom, which is considered an impulsive noise due to the short duration, fast rise time, and broad frequency band. Noise levels resulting from supersonic flight depends on aircraft type, altitude, Mach number, flight duration, and flight profile. During air combat training, aircraft are usually separated using a wide range of altitudes and power settings. Altitude is typically 20,000 feet AGL or more. At these altitudes, the effects of sonic booms at the surface are substantially reduced. In some situations, supersonic flight may be conducted at lower altitudes and for longer durations. Table 4-4 and Table 4-8 in Section 4.2 list the number of sonic booms expected to reach the surface of the water per day.

The 2002 EGTTR PEA used the Air Force's PCBoom3 model to estimate noise resulting from sonic booms over the various missions (Air Force 2002). This single-event model was used to calculate boom footprints resulting from specific operations, aircraft, trajectories, speeds, and altitudes (Air Force 2002). Noise values directly along the centerline of flight tracks were reported to range from a low of 2.2 psf (108.8 C-weighted Sound Exposure Level, [CSEL]) to a high of 26.9 psf (130.6 CSEL), though a psf between 0.5 and 4.0 are typical for most supersonic flight operations (Air Force 2002; Laney and Cavanagh 2000). The Final EIS for the initial F-22 operational wing beddown (Air Force 2001) estimated sonic boom peak overpressures at flight speeds of Mach 1.2 between 1.5 and 5.68 psf, depending on altitude. Sonic boom overpressures resulting from F-22 level flight at Mach 1.2 are provided in Table 3–7 of this document as 6.2 psf (10,000 feet altitude), 3.2 psf (20,000 feet altitude), and 2.1 psf (30,000 feet altitude).

Marine species at the surface of the water or in the air of the overwater ranges could be exposed to supersonic noise and sonic booms. The startling effect of a sonic boom can be stressful to an animal, and may cause a "flight or fight" response; however, such responses are generally expected to be temporary since there is no prolonged noise exposure (Air Force 2001).

Aircraft flights of Mach 4.3 to 4.5 may produce sound waves that can penetrate the water's surface (Air Force 2002). Some portion of the acoustic energy from this penetrating sound wave would be transmitted to the subsurface environment. For aircraft flights below Mach 4.3, the incident sonic boom wave is reflected off the water surface, although acoustic energy in the form of subsonic non-radiating plane waves that decay exponentially with depth may enter the water (Laney and Cavanagh 2000). It is not anticipated that F-22 aircraft flights would exceed Mach 4.3. Potential impacts resulting from supersonic flight would be primarily restricted to animals in the air or at the water surface. It should be noted that noise produced by aircraft moving at steep angles relative to vertical, such as during a dive, may penetrate the water more efficiently.

Marine mammals exposed to a sonic boom might be startled and exhibit a reaction, but their exposure is not expected to reach regulatory thresholds. The maximum overpressure of 26.9 psf discussed in the *Eglin Gulf Test and Training Range Final Programmatic Environmental Assessment* (Air Force 2002), generated at the water surface along the center line of the aircraft flight path, equates to less than 1 pound per square inch (psi). Further, analysis provided in the *Final EIS* for *Initial F-22 Operational Wing Beddown* (Air Force 2001) states that the strongest conceivable sonic boom generated during air combat training is less than 30 psf, which equates to 0.2 psi, and that the energy associated with a typical sonic boom is approximately 158 dB referenced to one squared micropascal-second (re 1 μPa^2-s). One of the current regulatory thresholds for Level B harassment under the MMPA is 23 psi, and the behavioral harassment threshold is 177 dB re 1 μPa^2-s. Therefore, pressure and acoustic energy associated with sonic booms are not expected to exceed harassment thresholds under the MMPA.

Regulatory thresholds have not been established specifically for sea turtles exposed to impulsive noise. In the absence of specific criteria, the thresholds described for marine mammals in the preceding paragraph are typically applied to sea turtles for impact estimates. Although sea turtles, including nesting sea turtles and hatchlings, could be startled by exposure to sonic booms, noise thresholds considered significant by regulatory agencies would not be exceeded. Similar to potential impacts due to subsonic flights, incidences of turtles surfacing at the same time as the arrival of a sonic boom would probably be infrequent. Nesting sea turtles and emergent hatchlings would not be exposed to sonic booms since supersonic flight does not occur within 15 nm of the shore; therefore, nesting activity is not likely to be adversely affected.

Birds at the surface or in flight within the airspaces would potentially be startled by exposure to supersonic noise. Birds at rest on the water surface may flush, and birds in flight would likely exhibit some reaction. For example, a study of seabirds at the Channel Islands off southern California reported a startle response caused by exposure to sonic booms, including initial flushing and a return to roost or previous activities within two to 10 minutes (see Manci *et al*. 1998). Supersonic flights near J. F. Kennedy International Airport resulted in a portion of nearby nesting herring gulls taking flight, and an increase in broken eggs that may have contributed to decreased clutch size. These studies suggest that behavioral responses would be more likely during supersonic flight than during subsonic flight, and that the consequences of such reactions could be greater. However, most responses would likely be temporary, as the noise is of short duration. Supersonic flight would not be conducted within 15 nm of the shoreline, eliminating the potential for sonic booms to affect nesting marine birds. There would be no significant impacts to shorebirds resulting from supersonic flights.

Water Quality Alteration - Water quality alteration refers to the release or deposition of chemical materials into the water column. Activities that result in deposition of chemical materials include jet fuel releases, chaff and flare use, and explosives use. These substances would disperse in the marine environment at some concentration and potentially affect marine species and habitat. Biological resources that are potentially affected include plankton, invertebrates, seagrass, birds, fish and essential fish habitat, marine mammals, and sea turtles.

Fuel release events may occur within overwater airspaces during air-to-air refueling, testing, or training involving drones that are downed into the water, and in-flight emergencies in which fuel tanks are jettisoned from the aircraft. Residual petroleum products could potentially

impact biological resources within the water column. Air-to-air refueling operations are typically conducted at higher altitudes ranging from 16,000 to 26,000 feet AGL. Fuel dispensing aircraft are fitted with instantaneous, automatic-closure devices to reduce fuel loss during transfers. Estimates of fuel losses during refueling events are approximately one quart during normal transfers and two gallons or less during unplanned emergency breakaways. Impacts to species and habitats resulting from these quantities would not be significant.

The 2002 EGTTR PEA evaluated fuel releases from the 99 annual downed drones. A total of approximately 49,000 gallons of fuel was associated with this level of activity (Air Force 2002). In addition, it was estimated that approximately 167,000 gallons of fuel is released annually in the EGTTR due to in-flight emergencies. Therefore, the total amount of released fuel was estimated to be approximately 216,000 gallons annually. To estimate potential effects, it was assumed that all fuel was distributed throughout the EGTTR (3.5×10^{11} square meters [m^2] surface area) to a depth of 0.5 meters, resulting in an affected volume of 1.75×10^{11} liters of water that does not interact with the remaining water of the Gulf of Mexico.

Assuming that all deposited fuel reaches the water surface, the resulting concentration would be approximately 3 micrograms per liter (µg/L). In reality, however, much of the fuel would not reach the surface because a large percentage evaporates as it descends through the atmosphere. A computer simulation model described in the 2002 PEA (Fuel Jettison Simulator Model) indicated that, for a typical mission scenario, only one percent of fuel ejected during emergencies would reach the water surface. In addition, most drone target testing occurs at higher altitudes, and a significant portion of the fuels and oils stored within the target drones would volatize during descent if released. Therefore, the actual concentration could be as little as 0.03 µg/L.

Exposure to petroleum distillates may result in toxicological effects to marine species including invertebrates and fish. Toxicity due to jet fuel exposure has been reported for various marine species over a range of 1 to 150 mg/L (Air Force 2002). Therefore, as a conservative measure, 1 mg/L is considered in this analysis as the level indicative of potential effects. Fuel concentration in the water column is expected to be 3 µg/L or less (possibly as little as 0.03 µg/L). Additionally, petroleum products have short half-lives and do not persist in the marine environment long-term as they are diluted by wave action, currents, and tides.

Due to these factors, effects to plankton species from fuel releases, although potentially resulting in mortality or toxicological effects to some individuals of local populations would have no significant impacts on populations in the eastern Gulf of Mexico. Fuel releases would not significantly impact invertebrate populations. The volatile nature of jet fuel; the location of the test ranges over deep, open waters; and the weather and topography of the region tends to minimize any potential low-level adverse impacts that may occur to invertebrates due to fuel releases. Further, it has been suggested that exposure to JP-8 jet fuel is not likely to result in bioaccumulation (USDS&HS 1993).

Habitat degradation within the water column that might adversely affect feeding, breeding, and spawning of fish is not anticipated from fuel releases. The releases would be localized and the fuel's fate in the water column would be short-term based on its volatility and non-persistent behavior. Localized impacts would be further reduced by the mobility of the fish species and their ability to move away from regions of degraded water quality. Bioaccumulation of JP-8 is

not expected to occur within marine fish species, even following extended exposures (USDS&HS 1993). Due to the volatile nature of fuels, releases are likely to impact only a small area. Wind, wave action, and ocean currents further facilitate fuel dilution and dispersion, reducing the potential for adverse effects. In addition, fuel releases occur sporadically and do not result in large concentrations of fuel being released in one specific area. These factors minimize the potential adverse effects from fuel releases to fish populations and the Gulf of Mexico fish community at large. In general, fuel releases are not expected to significantly impact widely dispersed pelagic and benthic fish. Further, fuel releases would not significantly impact estuarine, nearshore, or pelagic waters that function as EFH.

Fuel releases are not expected to impact marine or Neotropical bird species directly. Indirect effects such as toxic contamination of prey species are not likely to occur, as JP-8 fuel does not bioconcentrate in the food web (USDS&HS 1993). Additionally, fuel releases are not expected to affect marine mammal populations within the Gulf of Mexico adversely. The tendency for marine mammals to avoid regions of reduced water quality, particularly waters having reduced visibility, lessens the opportunity for direct exposure. Indirect impacts to marine mammals from feeding are also expected to be negligible. Marine mammals feed primarily on fish or invertebrate species of the region and the limited exposure of prey species to fuel releases reduce the potential for contaminant bioaccumulation within marine mammal fatty tissues. Furthermore, since many JP-8 contaminants are volatile, their bioaccumulation potential within marine mammal species is not expected to be high. Similarly, it is not anticipated that sea turtles would be significantly affected.

A variety of activities employ the use of bombs, missiles, aircraft guns, drones, chaff, and flares. Most of the bombs are inert and are constructed of hardened or cast steel. Bombs released into the Gulf of Mexico are assumed to remain relatively intact without casing ruptures. Similarly, most missiles are inert and are assumed to remain relatively intact. Drones are composed primarily of aluminum, and the engines may contain magnesium-thorium. Gunnery round projectiles, such as the 20 mm munition, is composed primarily of aluminum but also contains small amounts of copper, zinc, manganese, and lead. The concentrations of these materials are expected to be low and significant impacts to water quality are not anticipated.

Chaff consists of aluminum-coated fibers. Flares are high temperature heat sources that are ejected from aircraft to confuse and divert enemy heat-seeking or heat-sensitive missiles. Flares are also used to illuminate surface areas during nighttime operations. Chaff is dispersed over a wide area of the eastern Gulf of Mexico. A small portion of the aluminum (approximately 0.06 percent) may dissolve in seawater. It has been estimated that the seawater concentration of ionic aluminum resulting from all annual chaff use in the EGTTR (including missions originating from Tyndall AFB and Eglin AFB) could be up to 0.00778 µg/L (Air Force, 2002). Although there is no regulatory criterion for aluminum, it is a naturally occurring trace element in seawater and is present in variable concentrations averaging 5 µg/L (Air Force, 2002). Toxicity tests using marine organisms found in Chesapeake Bay, as reported in NRL (1999), showed no adverse effects when the species were exposed to chaff at concentrations of 100 or 1,000 times that associated with a typical chaff release event. The effects of ocean circulation and dilution would further reduce any effects. Therefore, there would be no significant impacts to fishes, marine mammals, sea turtles, or threatened or endangered species due to chaff expended in the Gulf of Mexico.

The primary constituent of interest in flares is magnesium. The 2002 EGTTR PEA evaluated the effects of flare use throughout the entire range, including flights originating at Tyndall AFB and using the airspace included in the Proposed Action of this document. The 2002 PEA analyzed annual deployment of nearly 203,000 flares and determined that the maximum seawater concentration would be less than one one-thousandths of a percent of background concentration. At the height of Tyndall AFB operations as a training base in 1998, the 325 FW deployed 152,930 flares into the warning areas. Baseline flare use associated with the F-22 training squadron currently at Tyndall AFB is approximately 64,000 flares, and the proposed new operational squadron would add only approximately 6,500 to this total. The additional 6,500 flares would add a negligible amount of magnesium to marine waters; therefore, no significant impacts are anticipated to fishes, marine mammals, sea turtles, or threatened or endangered species due to flare use over the Gulf of Mexico.

Explosive materials such as TNT, HMX, PBX, RDX, aluminum, ammonium nitrate, and other explosive detonation products may be introduced into the water column through their use in propellants, warhead components, and gun ammunition. The 2002 EGTTR PEA identified nearly 18,000 pounds net explosive weight (including propellant) expended throughout the entire EGTTR during a five-year period (Air Force 2002). Most of the munitions expended in association with the Proposed Action are inert so their chemical materials consist primarily of propellant. Normal operational deployment of ordnance would result in the combustion of nearly all propellant and explosive. It is possible that a weapon that did not function as intended could release some amount of explosive material into the Gulf of Mexico; however, the toxicological effects of introduced explosives on the affected environment are minimal. It was determined that the concentration of explosive material in the most heavily used warning area would be negligible at 0.0001 pounds per acre. There would be no significant impacts resulting from introduction of explosive materials into the water.

In summary, chemical materials released into the water column would be of a relatively minute quantity and would be diluted and dispersed by waves, winds, and tides. The various hydrocarbons contained in jet fuel are expected to readily evaporate from the water surface (HHS 1995). Microbial biodegradation of some of the fuel components would also occur to some extent, with the rate affected by fuel concentration (Zahed *et al.* 2010). Degradation by photolysis of some explosives, such as TNT, is expected; however, photolysis is not expected to strongly influence the fate of other explosives such as RDX (HHS 2010). Water concentrations chemical materials would not approach levels that could impact marine species including plankton, invertebrates, fish, birds, marine mammals, and sea turtles. Most chemical substances deposited would occur in relatively open waters away from the coastline. Releases near the shore and in St. Andrews Bay are expected to be minimal and the concentration of such materials transported from open waters would be low; therefore, seagrass would not be impacted.

Residual Materials – Residual materials refers to expendable material deposited into the water due to Air Force activities. Expendables may include downed target drones, discharged chaff and flares, missiles, bombs, and other exploded/inert munition remains. Residual materials are expected to consist primarily of drone fragments, bombs, missiles, small arms rounds, and chaff. Composition materials consist of aluminum, steel, plastic, copper, lead, and zinc, with the primary material being aluminum and steel.

It is possible that in some areas, large pieces of residual materials such as drone fragments could sink to the bottom and potentially damage habitat including hardbottom and special biological resource areas. Once deposited, these materials should remain and undergo corrosion. Some pieces may be carried by currents, causing minimal habitat alteration before becoming embedded in the sediments. However, they are unlikely to cause substantial harm to marine habitats. A comparison of the quantities of military solid residual materials expended in the EGTTR with artificial reef material purposely placed within warning areas was provided in Air Force (2002). The amount of artificial reef material, which is similar in composition to military residual materials, was found to be many times greater. In the short term, concrete, steel, and aluminum residual materials serve as a substrate for settling and encrusting organisms and thus provide structural heterogeneity to the bottom communities. The long-term fate of such inert materials is relatively unknown beyond a slow corrosive process. It is not expected that residual materials would cause adverse impacts to biological resources or habitats.

Deposition of residual materials onto areas of coral or hardbottom habitat (such as the Florida Middle Grounds) that occurs in waters of the W-470 airspace could potentially damage the reef structure, causing injury or mortality to benthic organisms and the species that rely upon the reef for habitat. Nevertheless, activities associated with the Proposed Action are not likely to impact such hardbottom areas substantially. Analysis of all activities occurring in W-470 concluded that over 20 years of activity would be required for one-tenth of a pound of steel to accumulate per acre in this area (Air Force 2002). In addition, residual materials decelerate while sinking through the water column, limiting the physical damage to any marine structure encountered. The 2002 PEA reported that over 2,800 tons of steel material could be found in the coastal artificial reef sites adjacent the Florida Middle Grounds region. Comparatively, Air Force residual materials contribute a very small amount of material within this region. No significant impacts to coral or hardbottom habitat, including the Florida Middle Grounds, are anticipated.

Direct Physical Impacts - Direct physical impacts could result from inert bombs, ammunition, shrapnel from live missiles, and drone fragments falling into the water. Species occurring at the surface, such as marine mammals and sea turtles, could potentially be injured or killed by falling projectiles and residual materials. Once the objects strike the water and begin to sink, their velocity would be greatly reduced and only animals at or very near the surface would be potentially impacted. Specific information for the dispersal patterns of missile shrapnel and drone fragments is unavailable. The approach used in a recent estimate of direct physical impacts resulting from all activities in the EGTTR (Federal Register 2006) is applicable. In this approach, the total surface area associated with 551 bombs, 1,183 missiles, 49 intact drones, and 50 fragmented drones was calculated. Fragmented drones were considered to impact five times the surface area of that impacted by intact drones. This total area was then multiplied by the estimated density of marine mammals and sea turtles at the surface. The resulting potential for injury or mortality to marine species was determined to be very low, in that many years of activity, on average, would be required before one animal was impacted. Given the number and size of objects that may fall into the water compared to the surface area of Gulf waters available, the dispersed distribution of marine species, and the fact that only animals near the surface could be impacted, direct physical impacts are not expected to be significant.

Direct impacts between military aircraft and birds are a concern from a human safety and environmental standpoint. The 2002 EGTTR PEA reports that all known bird strikes have occurred within three miles of shore (Air Force 2002). Although the possibility of strikes exists, bird-aircraft strikes are not expected to affect overall bird populations. There would be no significant impacts to bird populations resulting from aircraft strikes.

Construction - Construction activities, particularly those related to the alternate MSA route extension and MAC pad, could impact marine biological resources. The route extension is adjacent to a tidally influenced ditch that ultimately drains to St. Andrews Bay. Construction and operation of the route could result in increased amounts of sediment and pollutants entering estuarine and marine habitats, potentially affecting plankton, invertebrates, seagrass, fish, and EFH. To prevent such impacts, standard construction practices would be implemented for pre- and post-construction operations, as described in Sections 4.5 (Physical Resources) and Section 4.6.2.1 (Terrestrial Biological Resources). With implementation of these measures, significant impacts to marine biological resources are not anticipated and there would be no adverse effects to EFH. Lighting from the new construction associated with the Proposed Action would not be directly visible from nesting beaches, would not cause an increase in the level of indirect lighting, and would therefore not be expected to interfere with sea turtle nesting or hatching.

Critical Habitat - Critical habitat for the piping plover in the study area consists of intertidal beaches and flats. Gulf sturgeon critical habitat consists of the sediments in Gulf of Mexico nearshore waters one mile from the shore off Tyndall AFB. As discussed in previous sections, ocean and bay substrates would not be negatively impacted by implementation of the Proposed Action. Residual materials deposited into the water are not expected to alter sediments that function as critical habitat; therefore, there would be no impacts to piping plover or Gulf sturgeon critical habitat.

4.6.3 Alternative 1

4.6.3.1 Terrestrial Biological Resources

Construction - Construction activities under Alternative 1 would be the same as those discussed under the Proposed Action; therefore, potential impacts to wildlife and vegetation, threatened, endangered, and special status species/communities, and wetlands would be the same as those discussed under the Proposed Action in Section 4.6.2.1. No significant impacts to terrestrial biological resources from construction activities would occur under Alternative 1.

Air Operations - Potential impacts to terrestrial biological resources from aircraft operations under Alternative 1 would be the same as those discussed under the Proposed Action in Section 4.6.2.1. As discussed under the Proposed Action, aircraft noise would not be expected to pose a novel or new threat to birds and wildlife (including threatened, endangered, and special status species/communities) that would cause adverse reactions, other than temporary flight. The proposed changes in noise levels would not be significantly different from baseline conditions and are not expected to represent biologically significant changes for wildlife species or affect any threatened or endangered species populations adversely. No significant impacts to terrestrial biological resources from air operations would occur under Alternative 1.

4.6.3.2 Marine Biological Resources

Potential impacts to marine biological resources under Alternative 1 would be similar to those for the Proposed Action. Noise produced by subsonic flights would be somewhat decreased due to the lower number of sorties associated with 10 fewer T-38 aircraft. Noise produced by supersonic flights would the same, as under the Proposed Action since T-38 aircraft are not expected to use supersonic speeds. As with activities described under the Proposed Action, marine mammals, sea turtles, and birds at or near the water surface at the same time as an overflight, would hear and possibly react to subsonic noise and sonic booms. The effects however would likely be minor and temporary due the short duration of the noise. Sonic booms would not result in pressure or acoustic energy levels that would result in take under the MMPA. There would be no significant impacts to marine biological resources due to noise.

Deposition of fuel, chaff, flares, explosive and propellant material, and other residual materials would be similar to that described under the Proposed Action, although fuel releases could be fewer due to the decreased number of T-8A aircraft. The concentration of jet fuel in the water column resulting from releases and downed drones would be well below toxicity levels for marine organisms and bioaccumulation in the marine food web would not be expected. Metals from ordnance, chaff, and flares that can include steel, lead, zinc, aluminum, and magnesium would not accumulate in levels harmful to marine organisms. Residual materials such as ordnance and chaff would likely sink to the seafloor where it could produce minor impacts to bottom habitats, but would eventually corrode or become embedded in the sediment. The possibility of direct strikes to a marine animal resulting from falling ordnance and drones or drone fragments is considered low. There would be no significant impacts to marine biological resources due to deposition of materials into the water column.

Potential impacts to plankton, invertebrates, seagrass, fish, and EFH resulting from construction and operation of the alternate MSA route extension and MAC pad would be the same as under the Proposed Action. With implementation of standard construction practices for pre- and post-construction operations, as described in Sections 4.5.2 (Physical Resources) and 4.6.2.1 (Terrestrial Biological Resources), impacts to marine biological resources would not be significant. In addition, additional lighting associated with new construction would not be directly visible from sea turtle nesting beaches and would not cause an increase in the level of indirect lighting. There would be no impact to the successful nesting of sea turtles.

4.6.4 No Action Alternative

4.6.4.1 Terrestrial Biological Resources

Tyndall AFB would continue to manage its natural resources in accordance with state and federal regulations under either an action or a no-action decision. No-action would not pose additional affects to threatened, endangered, and special status species/communities, including wetlands. Biological resources would continue to be affected by normal operations associated with an active Air Force base.

4.6.4.2 Marine Biological Resources

Under the No Action Alternative, the F-22 operational squadron and the T-38 detachment would not beddown at Tyndall AFB. Potential impacts to marine biological resources due to noise, water quality alteration, residual materials deposition, and direct physical impacts would remain the same as those existing under current conditions. Construction activities would not take place. There would be no potential for construction-related impacts to water quality and the associated issues related to marine species. There would be no significant impacts to marine biological resources resulting from the No Action Alternative.

4.7 Cultural Resources

4.7.1 Methodology for Analysis

Properties identified in the APE by the Air Force are evaluated according to the NRHP criteria, in consultation with the SHPO and other parties. Typically, if the SHPO and other parties and the Air Force agree in writing that a property is eligible or not eligible to the NRHP, that judgment is sufficient for Section 106 purposes (36 CFR 800.4[c][2]). Procedures and criteria for this can be found in 36 CFR 63, *Determinations of Eligibility for Inclusion in the National Register of Historic Places* and in the Tyndall AFB *Integrated Cultural Resource Management Plan (ICRMP)* (Air Force 2010a).

Effects (i.e., impacts) to cultural resources are defined as "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register" (36 CFR 800.16(i)). For the purposes of this analysis, "effects" are discussed as either adverse or not adverse. An adverse effect "is any physical intrusion to an individual structure, district, or other cultural resource or to its surrounding property boundary caused by the Proposed Action" (40 CFR 1508.8).

4.7.2 Proposed Action

Currently, no adverse effects to cultural resources are expected from implementation of the Proposed Action. The entire APE has previously been surveyed for cultural resource presence/absence. One historic structure, Building 156/Hangar #3, is the only WWII hangar on Tyndall AFB. It is considered as potentially eligible to the NRHP under Criteria A and C. Temporary WWII structures are covered under the Programmatic Agreement. As this structure is scheduled for renovation, an undertaking that may affect the integrity by altering elements that make the structures significant, further evaluation is required and mitigation may be recommended. Any such plans must be submitted to 325 CES/ CEANN (Asset Management Flight, Natural Resources Management Section) for review as part of the EIAP process (Air Force 2010a). If these measures are implemented, no adverse effects to historic structures are anticipated under this alternative. Construction projects 6, 11, 12, 14, 15 and 16 (see Figure 2-1) are categorically excluded under the 1996 Historic Preservation Plan due to significant prior alteration. 325 CES/CEANN may monitor ground-disturbing activity when construction begins.

No archaeological resources within the APE have been identified to date as eligible for listing on the NRHP. In addition, no historic districts, cemeteries, sacred sites, or traditional cultural properties are identified within this alternative area or the MSA. No adverse effects to historic properties, traditional cultural properties, sacred sites, or native villages are expected to occur under existing MOAs, ATCAAs, or warning areas due to the proposed addition of 21 F-22 and 20 T-38 Aircraft. F-22 and T-38 training activities would utilize the same airspace and conduct similar missions as existing F-22 aircraft at Tyndall AFB. As presented in Chapter 2 of this document, the majority of operations would occur primarily over 30,000 feet. Adverse effects to cultural resources resulting from any modest increase in flare or chaff usage or operational noise would not be expected under this Proposed Action.

Eight federally recognized Native American groups were delivered official notice of the Proposed Action during IICEP and were provided with copies of the Draft EA through certified mail. Tyndall AFB contacted the tribes for input a second time via e-mail on June 21, 2011 and again by certified mail on July 5, 2011. Of the tribes contacted, the Miccosukee Tribe of Indians of Florida verbally concurred with the proposed beddown with no objections (Appendix A). The Seminole Tribe of Florida provided a written letter indicating no comments on the proposed beddown (Appendix A). No responses were received from the remaining tribes.

In the event of an inadvertent discovery during construction, all work would cease until the Tyndall AFB historic preservation officer and cultural resources branch are notified and the area is further inspected.

4.7.3 Alternative 1

One historic structure, Building 156/Hangar #3, is the only WWII hangar on Tyndall AFB. It is considered as potentially eligible to the NRHP under Criteria A and C. Temporary WWII structures are covered under the Programmatic Agreement. As this structure is scheduled for renovation, an undertaking that may affect the integrity by altering elements that make the structures significant, further evaluation is required and mitigation may be recommended. Any such plans must be submitted to 325 CES/CEANN for review as part of the EIAP process (Air Force 2010a). If these measures are implemented, no adverse effects to historic structures are anticipated under this alternative.

The entire APE has previously been surveyed for cultural resource presence/absence. No archaeological resources within the APE have been identified to date as eligible for listing on the NRHP. In addition, no historic districts, cemeteries, or traditional cultural properties are located within this alternative area or the MSA. Currently, no adverse effects to archaeological resources are expected from implementation of the Alternative 1.

No adverse effects to historic properties, traditional cultural properties, sacred sites, or native villages are expected to occur under existing MOAs, ATCAAs, or warning areas due to the proposed addition of 21 F-22 and 10 T-38 Aircraft. F-22 and T-38 training activities would utilize the same airspace and conduct similar missions as existing F-22 aircraft at Tyndall AFB. As presented in Chapter 2 of this document, the majority of operations would occur primarily over 30,000 feet. Adverse effects to cultural resources resulting from any modest increase in flare or chaff usage or operational noise would not be expected under this alternative.

In the event of an inadvertent discovery during construction, all work would cease until the Tyndall AFB historic preservation officer and cultural resources branch are notified and the area is further inspected.

4.7.4 No Action Alternative

Under the No Action Alternative, the Air Force would not implement the proposed project activities and as a result, no adverse effects to cultural resources would occur.

4.8 Land Use

4.8.1 Methodology for Analysis

A qualitative method was used to assess potential land use impacts. On-base impacts are based on whether the Proposed Action or Alternative 1 construction activities would result in a change to the existing land use, the degree to which the existing land use would be affected by the change, and if the change would be compatible with adjacent land uses and development. Off-base land use impacts are based primarily on the analysis of the effects of flight operations under the Proposed Action and Alternative 1 and if the change in noise exposure would have an adverse impact on land use compatibility. Incompatible land use impacts that would result from noise generated from flight operations were evaluated using the AICUZ guidelines presented in the Tyndall AFB AICUZ Study (Tyndall AFB 2008a) as well as the FICUN guidelines discussed in Appendix B. As discussed in Section 3.8, the AICUZ program is used to promote compatible land development in areas subject to aircraft noise. The AICUZ noise zones are defined as 65–69 dB L_{dn}, 70–74 dB L_{dn}, 75–79 dB L_{dn}, and greater than 80 dB L_{dn}.

4.8.2 Proposed Action

Implementation of the Proposed Action would require renovation of existing facilities as well as construction of new facilities and roadways. The renovation and construction activities would occur primarily along the flightline and in the MSA. Functions on the flightline are categorized as aircraft O&M, industrial, and airfield. Construction projects 1, 2, 3, 4, 6, 8, 9, and 10, as listed in Table 2–3, are necessary to support the O&M of the F-22 and T-38 aircraft and therefore are sited along the flightline. Similar activities have been conducted in the area in support of the F-22 training squadron, and up until recently, the F-15 squadrons so the Proposed Action would not require a change to the existing land and facilities use. Project 11, the deployment-processing center, is a new facility proposed near the flightline. As a training base, Tyndall AFB has not had a requirement for deployments, which would be a standard activity for the proposed F-22 operational squadron and would require a deployment processing facility to marshal personnel prior to deployments. The site is currently categorized primarily as open space with a portion of airfield pavements. With the construction of the deployment-processing center, land use would change from open space to aircraft operations and maintenance, which would be compatible with nearby land uses. The resulting change in land use would be noted in the Tyndall AFB General Plan.

Proposed Projects 5, 7, 12, 14, 15, and 16 in Table 2–3 are sited within or near the existing MSA whose land use is categorized as industrial. The proposed MSA projects are designed to

supplement the MSA's capacity and capabilities to support additional F-22 aircraft. Therefore, the proposed MSA facilities would not require a change in land use. No significant impacts would be anticipated to land use resulting from the proposed construction activities.

The munitions storage igloos (Project 14), the MAC pad (Project 12), and portions of the alternate MSA egress route (Project 7) under the Proposed Action would likely occur within the 100-year floodplain (Figure 4–5**)**. Additionally, the entire MSA is located in a storm surge area for Category 3 hurricanes. Due to safety regulations and the need to consolidate the munitions storage igloos in the existing MSA, there are no practicable alternative locations available outside of the MSA. The only available site within the MSA is partially within a 100-year floodplain. As a result, the proposed facilities in the MSA would need to be designed to prevent flooding of the structures and damage to property. Drainage would also be designed to prevent flooding in adjacent areas and downstream. The small amount of previously disturbed area affected within the floodplain would not alter the function of the floodplain and the impacts would be less than significant. Areas of new construction (approximately one acre) would need to follow applicable standard construction practices, SWPPP, and other regulations to insure minimal impact to floodplains. In accordance with EO 11988, the Air Force has prepared a FONPA. No significant impacts to floodplains are anticipated.

Project 7, the alternate MSA egress route, would extend into a portion of the airfield CZ. As discussed in Section 3.3, the area surrounding a runway must be kept free of structures that might damage an aircraft and an airfield waiver would be required for any structures that project above an imaginary surface. The alternate MSA egress would not present a hazard to aircraft or project above an imaginary surface. Therefore, no airfield waiver would be required for the roadway and no significant impacts to the airfield land use would be expected.

To comply with the Federal Coastal Zone Management Act, a consistency determination is included in Appendix C. A letter dated July 21, 2011 from the Florida Department of Environmental Protection determined the proposed activities are consistent with the Florida Coastal Management Program. Final concurrence would be determined during the environmental permitting process in accordance with Section 373.428, *Florida Statutes*.

With an addition of 671 personnel supporting the F-22 operational squadron and up to 14 contractor personnel supporting the T-38 detachment, traffic is expected to increase, particularly at the gates and on the road system on the flightline side of the base; however, it is not expected that traffic volumes would substantially change from historic levels such as when Tyndall AFB hosted personnel associated with two squadrons of F-15 aircraft. Therefore, no significant impacts to transportation are anticipated. Road and gate improvement projects have been proposed under separate NEPA documentation, which is discussed further in Chapter 5.

Construction and renovation activities are not expected to interfere with or change outdoor recreation provided on or near the base. Recreation would remain as described in Section 3.8.

As discussed fully in Section 4.2, noise levels near the airfield would change from baseline noise levels due to the new F-22 and T-38 flight operations. Excluding areas of water and land on Tyndall AFB, approximately 746 acres and 786 people located off base would be affected by noise levels greater than 65 dB L_{dn} under the Proposed Action. Noise levels 75 L_{dn} and greater are isolated to Tyndall AFB and open water areas. Approximately 59 acres in the city of Parker

would be exposed to noise levels between 70 and 74 L_{dn} and 184 acres would be affected by noise levels between 65 and 69 L_{dn} (Table 4–1). These acreages represent an increase in the area affected by aircraft noise levels as compared to baseline in the city of Parker. The newly affected areas of Parker include residential, commercial, and mixed-use land use categories. These land uses are compatible with noise levels less than 75 L_{dn} with the incorporation of noise attenuation. Noise levels between 65 and 69 L_{dn} affect 20 acres in the city of Callaway, nearly three acres in the city of Panama City, 184 acres in the city of Parker, and 480 acres in the unincorporated portions of Bay County. These noise levels and the areas affected represent a decrease of noise effects to the unincorporated Bay County. As discussed in Section 4.2, individuals exposed to these aircraft noise levels may experience annoyance; however, changes in land use are not expected. Additionally, as an active air base that regularly experiences aircraft noise, these noise levels are not anticipated to impact ongoing recreational activities. Therefore, no significant impacts to land use near Tyndall AFB are anticipated due to changes in noise levels.

Section 4.2 describes noise levels in the primary airspace in detail. Noise levels in the Tyndall MOAs under the Proposed Action would be comparable to the noise levels experienced under baseline levels. Table 4–24 describes the noise levels in the Tyndall MOAs under the Proposed Action in relation to the special land use areas discussed in Section 3.8. Therefore, no impacts to land use or recreational opportunities in the counties or special land use areas located below the airspace are anticipated.

Table 4–24. Noise Levels under Special Land Use Areas

Airspace Unit	Noise Level Day-Night Average Sound Level (L_{dnmr}) in decibels (dB)				Special Land Use Area
	Baseline	Proposed Action	Alternative 1	No Action Alternative	
Tyndall B/Compass Lake Work Area	62	62	62	61	Falling Waters State Park Chipley, Florida
Tyndall B/C/H/Compass Lake Work Area	58-62	58-62	58-62	57-61	Florida Caverns State Park Marianna, Florida
Tyndall C/H/Compass Lake Work Area	58-62	58-62	58-62	57-61	Torreya State Park, Bristol, Florida
Tyndall D/E/Carrabelle Work Area	58	58	58	57	Apalachicola National Forest Liberty County, Florida
Tyndall E/Carrabelle Work Area	58	58	58	57	Ochlockonee River State Park Sopchoppy, Florida
					Bald Point State Park Alligator Park, Florida
					Mud Swamp New River Wilderness Apalachicola National Forest
					Bradwell Bay Wilderness Apalachicola National Forest
					St. Vincent National Wildlife Refuge Apalachicola, Florida
Tyndall F	44	44	44	43	St. Joseph Peninsula State Park Apalachicola, Florida
Tyndall G	67	67	67	66	Dr. Julian G Bruce St. George Island State Park St. George Island, Florida

Due to the minimal change in land uses, traffic volumes, or impacts to land uses or recreation from noise levels at the airfield or under the airspace, no significant impacts are anticipated from the implementation of the Proposed Action.

4.8.3 Alternative 1

Under Alternative 1, construction activities and potential changes to land uses would be the same as those discussed under the Proposed Action.

The effects of the implementation of Alternative 1 to traffic volumes would be the same as those discussed in Section 4.8.2 under the Proposed Action. Construction and renovation activities are not expected to interfere with or change outdoor recreation provided on or near the base. Recreation would remain as described in Section 3.8. Therefore, no significant impacts are anticipated resulting from construction activities or changes in traffic volumes.

As discussed in Section 4.2, noise levels near the airfield would change from baseline noise levels due to reflect the noise levels for the new F-22 and T-38 flight operations. Excluding areas of water and land on Tyndall AFB, approximately 744 acres and 781 people located off base would be affected by noise levels greater than 65 L_{dn} under Alternative 1. Noise levels between 70 and 74 L_{dn} would affect portions of the city of Parker (Table 4–5). Noise levels between 65 and 69 L_{dn} would affect portions of Parker, Callaway, Panama City, and unincorporated Bay County. The newly affected areas of Parker and Panama City include residential, commercial, and mixed-use land use categories. These land uses are compatible with noise levels less than 75 L_{dn} with the incorporation of noise attenuation. These noise levels and the areas affected represent a decrease of noise effects to the unincorporated Bay County. As discussed in Section 4.2, individuals exposed to these aircraft noise levels may experience annoyance; however, changes in land use are not expected. Additionally, as an active air base that regularly experiences aircraft noise, these noise levels are not anticipated to impact ongoing recreational activities. Therefore, no significant impacts to land use near Tyndall AFB are anticipated due to changes in noise levels.

Noise levels in the Tyndall MOAs would be comparable to those experienced under baseline levels and are not anticipated to impact land use or recreational opportunities in the counties or special land use areas below the airspace. Table 4–24 describes the noise levels in the Tyndall MOAs under Alternative 1 in relation to the special land use areas discussed in Section 3.8.

Due to the minimal change in land uses and traffic volumes as well as impacts to land uses and recreation from noise levels at the airfield or under the airspace, no significant impacts are anticipated from the implementation of Alternative 1.

4.8.4 No Action Alternative

Under the No Action Alternative, no construction or renovation activities related to the F-22 operational squadron or the T-38 detachment would occur. Noise levels under the No Action alternative are less than the levels published in the 2008 AICUZ; therefore, land use, recreation, and traffic would remain as described in Section 3.8.

4.9 Socioeconomics

4.9.1 Methodology for Analysis

To assess the potential socioeconomic impacts of the Proposed Action and alternatives, employment, housing, and school resources in the ROI were analyzed as presented in Section 3.9. Potential socioeconomic impacts were assessed in terms of the direct effects of the proposal on the local economy and related effects on population and socioeconomic attributes. If potential socioeconomic impacts would result in substantial shifts in population trends, or adversely affect regional spending or earning patterns, then impacts would be considered significant. Socioeconomic impacts would also occur if changes associated with the Proposed Action or Alternatives substantially affected demand for housing or community services (such as schools) or economic stability in the region. Existing demographic and economic characteristics in Bay County were analyzed to assess the potential socioeconomic impacts of the proposed beddown of an operational F-22 squadron and a T-38 detachment at Tyndall AFB. The Proposed Action involves several factors that might affect socioeconomic resources including facility renovation and construction and personnel changes.

4.9.2 Proposed Action

The proposed construction activities would generate a number of direct construction-related jobs and additional jobs through the multiplier effect of regional purchases. Construction activity would also contribute to regional economic output and household incomes; however, these potential effects would be temporary, lasting only for the duration of the construction activity. The regional construction industry could accommodate the proposed renovations and facility construction. It is anticipated that most of the temporary employment would be experienced within Bay County. Therefore, any construction related impacts associated with the Proposed Action would not be significant.

The beddown of the F-22 squadron and a T-38 detachment would require approximately 671 personnel associated with the F-22 operational squadron and 14 contractors to support the T-38 detachment. Assuming 2.2 dependents per personnel member, the total population increase would be 1,507 dependents including spouses and children.

The number of incoming personnel associated with the beddown of the F-22 squadron and the T-38 detachment would not exceed the number of personnel stationed at Tyndall AFB during operations prior to FY2010. Therefore, the overall change in population within the ROI would likely be negligible and not anticipated to represent a significant change in population.

The beddown of the F-22 squadron and T-38 detachment would also increase employment within the ROI. An increase in direct employment would be the result of the 685 jobs created. These jobs would be filled by the incoming personnel and would typically have the potential to induce job growth, as goods and services are needed to support the new personnel. The direct and indirect jobs created due to the beddown would most likely be negligible when considered with the recent loss of direct and indirect jobs associated with the drawdown of the F-15 at Tyndall AFB. Therefore, no significant impacts are anticipated to employment associated with the Proposed Action in the ROI.

It is likely that the majority of incoming personnel would choose to live within Bay County. Assuming one housing unit per personnel member, the demand for housing could increase by as much as 685 housing units. The estimated number of vacant housing units in Bay County in 2010 totaled 31,212 units (Census 2010a). The number of housing units demanded by the change in personnel may be less than 685 housing units if personnel are housed on the base. The size of the housing market in the ROI and the availability of vacant housing units are expected to provide sufficient housing units for the incoming personnel. Therefore, no significant impacts are anticipated to housing from the Proposed Action.

It is anticipated that the incoming F-22 personnel would be accompanied by spouses and school-aged children. Out of the estimated 1,507 dependents, approximately 679 (45 percent) are estimated to be school-aged children between the ages of 4 and 18. Since the number of personnel associated with the F-22 beddown would not exceed the number of personnel historically assigned to Tyndall AFB, the number of dependents associated with the F-22 personnel would also not be expected to exceed the number of dependents historically associated with Tyndall AFB. Therefore, it is anticipated that there would be no significant impacts to the school districts in Bay County since they would have the capacity to accommodate the change in the number of students.

Using 2010 Census data, the number of off-base residents affected by noise levels greater than 65 dB DNL is expected to increase from 593 persons under the baseline conditions to 786 persons under the Proposed Action. The number of people residing off base that would experience annoyance from noise levels above 65 dB DNL would increase under the Proposed Action. However, the noise levels would be below levels expected to lead to changes in economic decisions or other socioeconomic factors and therefore are not anticipated to result in a significant impact.

4.9.3 Alternative 1

Under Alternative 1, construction activities would result in the same construction-related impacts to socioeconomic resources as described under the Proposed Action in Section 4.9.2. In addition, personnel changes under Alternative 1 would be the same as those described under the Proposed Action in Section 4.9.2.

Using 2010 Census data, the number of persons affected by off-base noise from Tyndall AFB under Alternative 1 was estimated. The number of residents affected by noise levels greater than 65 dB DNL due to the F-22 squadron and T-38 detachment is expected to increase from 593 persons under the baseline conditions to 782 persons under Alternative 1. Impacts to socioeconomic resources would be similar to those described in Section 4.9.2 and therefore, no significant impacts to socioeconomics are anticipated from the implementation of Alternative 1.

4.9.4 No Action Alternative

Under the No Action Alternative, the Air Force would not beddown an operational F-22 squadron or a T-38 detachment. Thus, the Air Force would not perform any construction and renovation of facilities at Tyndall AFB. In addition, there would be no personnel coming to Tyndall AFB. Under the No Action Alternative, socioeconomic resources such as population,

employment, housing, and school enrollment would continue below historic levels at Tyndall AFB. Using 2010 Census data, the number of off base residents affected by noise levels greater than 65 dB DNL is 232 persons, which is less than the number of people affected by the 2008 AICUZ.

4.10 Environmental Justice

4.10.1 Methodology for Analysis

The demographic profile of the region provides the context within which the environmental justice analysis was conducted (Air Force 1997). To determine whether environmental impacts would disproportionately affect minority or low-income populations, it is necessary to establish an appropriate basis of comparison. This basis is the "community of comparison" which consists of the geopolitical units that encompass the noise impact footprint of the Proposed Project. The environmental justice analysis used this community of comparison to define the affected area. Most environmental effects from the alternatives are expected to occur within areas encompassing the base as well as on lands under the airfield noise contours. Noise impacts within the airspace associated with the F-22 and T-38 beddown were also considered. If there were a potential increase in the number of persons adversely affected by the 65 dB L_{dn} and above noise contour or a change in the airspace noise levels, a more-detailed evaluation would be completed. This includes estimating the percentage of minority and low-income persons that would be affected by the increased noise. A comparison is then made between these percentages and the ones previously calculated for the community of comparison to determine if there would be disproportionate effect under the noise contour due to the proposed activity.

Population estimates for geographic areas underlying the airfield noise contours (i.e., for existing and proposed conditions) were calculated using data from the 2010 Census. Data for variables including total population, race, ethnicity, and poverty status were developed for block groups beneath the 65 dB L_{dn} -and-above noise contours. Block groups are geographic units of analysis defined by the 2010 Census that generally comprise of one to four city blocks containing approximately 550 housing units, though in rural areas they contain larger areas defined by physical or political boundaries such as county lines. In cases where part of a block group was located under the noise contour, the percentage of the individual block group located under the contour was calculated and then used to multiply the Census variables for greater accuracy. Data for the individual block groups were then summed to estimate the total population, minority population, and low-income population under the noise contours.

In accordance with EO 13045, areas affected by high noise levels of 65 dB L_{dn} and above were identified and the percentage of children ages 17 and younger was calculated. Locations of schools and childcare centers were also analyzed as noise-sensitive receptors.

4.10.2 Proposed Action

Under the Proposed Action, no disproportionately high and adverse human health or environmental effects have been identified to minority or low-income populations due to construction activities at Tyndall AFB. Construction and renovation activities would occur

within the boundaries of Tyndall AFB and would not impact off-base populations. Therefore, no significant impacts are anticipated to environmental justice areas of concern from construction activities under the Proposed Action.

Under the Proposed Action, an estimated 786 off base residents would be affected by noise levels greater than 65 dB L_{dn}. Of these affected residents, 158 (20.1 percent) would be minority and 70 (8.79 percent) would be low-income. As described under Section 3.10, in Bay County (defined as the community of comparison), the minority population comprises 15.2 percent of the total population, and the low-income population comprises 12.5 percent. Therefore, flight operations from the F-22 and T-38 training missions would not present a disproportionately high and adverse environmental effect to minority or low-income populations since the share of affected populations of concern is comparable to the populations of concern in Bay County.

Under the Proposed Action, the noise levels at Tyndall Elementary would remain the same relative to baseline conditions. Noise levels at Parker Elementary would remain below 65 L_{dn}. Therefore, implementation of the Proposed Action would have the same impact to children as under the baseline conditions.

Noise levels in the training airspace under the Proposed Action would not generate disproportionately high and adverse human health or environmental effects impacting minority populations, low-income populations, or children living under the airspace since the noise levels generated in these airspace units under all of the scenarios would remain comparable to the noise levels under baseline conditions. Therefore, no significant impacts are anticipated to environmental justice areas of concern under the Proposed Action.

4.10.3 Alternative 1

No disproportionately high and adverse human health or environmental effects have been identified to minority or low-income populations due to construction activities at Tyndall AFB under Alternative 1. Construction and renovation activities would occur within the boundaries of Tyndall AFB and would not impact off-base populations. Therefore, no significant impacts are anticipated to environmental justice areas of concern from construction activities under Alternative 1.

Noise impacts to environmental justice areas would be similar to those described under the Proposed Action in Section 4.1.2; however, under Alternative 1, the number of T-38 aircraft would be less than the number identified in the Proposed Action. Under Alternative 1, an estimated 782 off base residents would be affected by noise levels greater than 65 dB L_{dn}. Of these affected residents, 69 (8.72 percent) would be minority and 157 (20.1 percent) would be low-income. As described under Section 3.10, in Bay County (defined as the community of comparison), the minority population comprises 15.2 percent of the total population, and the low-income population comprises 12.5 percent. Therefore, flight operations from the F-22 and T-38 training missions would not present a disproportionately high and adverse environmental effect to minority or low-income populations since the share of affected populations of concern is comparable to the populations of concern in Bay County.

Under Alternative 1, the noise levels at Tyndall Elementary would remain the same relative to baseline conditions. Noise levels at Parker Elementary would remain below 65 L_{dn}. Therefore, implementation of Alternative 1 would have the same impact to children as under the baseline conditions.

Noise levels in the training airspace under Alternative 1 would not generate disproportionately high and adverse human health or environmental effects impacting minority populations, low-income populations, or children living under the airspace since the noise levels generated in these airspace units under all of the scenarios would remain comparable to the noise levels under baseline conditions. Therefore, no significant impacts are anticipated to environmental justice areas of concern under Alternative 1.

4.10.4 No Action Alternative

Under the No Action Alternative, the Air Force would not beddown an operational F-22 squadron or a T-38 detachment. The Air Force would not implement construction and renovation activities as described under the Proposed Action and therefore, no disproportionately high and adverse human health or environmental effects would occur to minority or low-income populations from construction related activities. An estimated 232 off-base residents are affected by noise levels greater than 65 dB $L_{dn,}$ a decrease as compared to the noise levels in the 2008 AICUZ. Of these affected residents, 51 (22.1 percent) are minority and 25 (10.65 percent) are low-income. As described under Section 3.10, in Bay County (defined as the community of comparison), the minority population comprises 15.2 percent of the total population, and the low-income population comprises 12.5 percent. Therefore, under the No Action Alternative, there would not be a disproportionately high and adverse environmental effect to minority or low-income populations since the share of affected populations of concern is comparable to the populations of concern in Bay County.

Under the No Action Alternative, the L_{dn} at Tyndall Elementary School is 2 dB less relative to the 2008 AICUZ. In addition, the L_{dn} at Parker Elementary School is less by 2 dB relative to the 2008 AICUZ; therefore, implementation of the No Action Alternative would have a lesser impact to children at these locations.

In addition, noise levels in the training airspace under the No Action Alternative would not generate disproportionately high and adverse human health or environmental effects impacting minority populations, low-income populations, or children living under the airspace since the noise levels generated in these airspace units would decrease as compared to baseline conditions. Therefore, no significant impacts are anticipated to environmental justice areas of concern under the No Action Alternative.

4.11 Infrastructure

4.11.1 Methodology for Analysis

Potential impacts on infrastructure elements are assessed in terms of effects of implementing construction projects and personnel changes on existing service levels. Impacts on utilities are assessed with respect to the potential for disruption or improvement of current utility systems,

deterioration or improvement of existing levels of service, and changes in existing levels of utility safety. Impacts may arise from physical changes to utility corridors, construction activity, and changes in the demand for services caused by changes in personnel.

The evaluation also provides a descriptive assessment of measures being implemented to achieve the Air Forces' energy vision and strategies to meet reductions as set out in the laws and EOs listed in Section 3.11.1.1. The analysis focuses on project elements that could impede progress toward desired goals for the installation and emphasizes the positive measures incorporated into projects and the installation as a whole that achieve benefits towards reaching sustainability goals.

4.11.2 Proposed Action

Potable Water System - The proposed beddown of 21 F-22 and 20 T-38 aircraft at Tyndall AFB is not anticipated to result in an increase in the overall number of personnel as compared to levels previously experienced at Tyndall AFB. With an average per capita household water use estimation of about 70 gallons per day (AWWA 2011), it is anticipated that any additional on-base consumers would generate an increase of less than 1 percent over current demand. Tyndall AFB receives its water supply from Bay County at three locations on base and the installation currently has onsite potable water storage of approximately 400,000 gallons as well as additional water storage for fire suppression. Water pressure on the base ranges from 60-78 psi, well above the DoD requirement of 40 psi and the state recommendation of 20 psi (Tyndall AFB 2007a). This system would experience minimal impact from the Proposed Action.

Sanitary Sewer System – Tyndall AFB discharges its wastewater to the Bay County AWWTP, where they are allowed by permit to discharge a monthly average of up to 1.26 MG of wastewater per day. The average discharge in FY11 was less than 0.9 MGD. The existing base sanitary sewer system is adequate to serve the current number of personnel at Tyndall AFB. The USEPA estimates that the average person generates approximately 70 gallons per day of wastewater between showering, toilet use, and general water use (AWWA 2011). As there is no increase in manpower over past levels, no impact is anticipated to the sanitary system of Tyndall AFB.

Stormwater Drainage System – Tyndall AFB has an extensive stormwater piping network. Stormwater from the industrial areas of the base and the property that surrounds the runway is channeled to one of the seven outfall locations via the storm drain network (Tyndall AFB 2007b). The Tyndall AFB SWPPP would be amended to reflect changes in facility design, construction, operation, or maintenance associated with the Proposed Action. These amendments would be implemented to the maximum extent practical.

Solid Waste Management – Off-base contractors completing any construction projects at the Tyndall AFB would be responsible for disposing of waste generated from these activities. Contractors would be required to comply with federal, state, and local regulations for the collection and disposal of municipal solid waste from the installation. Much of this material can be recycled, reused, or otherwise diverted from landfills. All non-recyclable construction and demolition waste would be collected in a dumpster until removal. Construction and demolition waste contaminated with hazardous waste, ACM, LBP, or other undesirable components would

be managed in accordance with AFI 32-7042. Only minor impacts are anticipated to the solid waste management system at the Tyndall AFB installation due to the limited amount of proposed renovation and construction.

Electrical System – The demand for energy (primarily electricity) could increase during activities associated with the beddown of 21 F-22 and 20 T-38 aircraft. Construction of new facilities would result in an increase in electrical consumption. Data from the U.S. Energy Information Administration (USEIA 2011) was used to identify that consumers averaged about 7,580 kWh annually per person. The Air Force expects increases in electrical use associated with new facilities to be less than current standard consumption given new requirement to reduce energy levels in federal facilities. This is achieved through using Leader in Energy and Environmental Design (LEED) strategies and "green" specifications. The supply grid for the Tyndall AFB electrical energy would be adequate and not affected by the increased demand.

Natural Gas System – As additional heated working and administrative spaces are developed and operations change with the beddown of 21 F-22 and 20 T-38 aircraft at Tyndall AFB, there could be an increase in natural gas consumption at Tyndall AFB. The natural gas energy supply grid at Tyndall AFB is currently operating well within its capacity (Air Force 2007) and would be adequate to support the increased demand.

As each component of the Tyndall AFB infrastructure would function below capacity with the implementation of the Proposed Action, there would be no significant impact to infrastructure.

4.11.3 Alternative 1

Potential impacts to infrastructure would be the same as those described in the Proposed Action. Therefore, there would be no significant impact for implementation of Alternative 1.

4.11.4 No Action Alternative

Under the No Action Alternative, the beddown of F-22 and T--38A aircraft at Tyndall AFB would not occur. The use of utilities and power and waste generation at Tyndall AFB would experience no change from the current levels.

4.12 Hazardous Materials and Waste

4.12.1 Methodology for Analysis

The qualitative and quantitative assessment of impacts from hazardous materials and waste management focuses on how (and to what degree) the Proposed Action may affect hazardous materials usage and management, hazardous waste generation and management, and hazardous waste disposal. An impact is considered significant if the following conditions are met:

1. The generation of hazardous waste types or quantities could not be accommodated by the current management system, or

2. There would be an increased likelihood of an uncontrolled release of hazardous materials, which could potentially contaminate the soil, surface water, groundwater, or air.

4.12.2 Proposed Action

Hazardous Materials and Wastes - The beddown of 21 F-22 and 20 T-38 aircraft at Tyndall AFB is not anticipated to change the quantities of hazardous materials and petroleum substances used at the installation. In 2004, with a total of 162 aircraft and missiles/drones assigned, the annual JP-8 fuel consumption on Tyndall AFB was approximately 44.5 MG (Tyndall AFB 2004). In calendar year 2010, with 78 aircraft and drones assigned, the throughput of JP-8 on Tyndall AFB was approximately 20.9 MG. The beddown of 21 F-22 and 20 T-38 aircraft at Tyndall AFB would increase the number of total aircraft and drones assigned to Tyndall AFB to 119, which would likely increase the level of JP-8 consumption from 2010 levels. However, it is not anticipated that the fuel consumption would increase significantly over peak levels already experienced at the installation. Any insignificant increase in fuel consumption is supportable by the current infrastructure at the installation. Any changes to the storage and transportation of fuel would need to be addressed in changes to the Tyndall AFB SPCCP.

There would be a short–term increase in the quantity of hazardous materials and petroleum substances stored at the installation to support construction activities since various fuels (e.g., diesel, gasoline) would be required to run earth-moving equipment and power tools and to provide electricity and lighting as conditions warrant. The number of sites storing, using, and handling hazardous materials may change slightly with the beddown of 21 F-22 and 20 T-38 aircraft at the installation; however, the authorization process already in place for the acquisition of these materials would ensure that only the specific types and quantities necessary to carry out the mission would be brought to Tyndall AFB.

The quantity of hazardous waste generated at Tyndall AFB is not anticipated to change materially with the beddown of 21 F-22 and 20 T-38 aircraft. The status of Tyndall AFB as a large quantity generator pursuant to the RCRA would not change. Any additional hazardous waste generation or handling areas (e.g., IAPs) that are established due to the beddown of 21 F-22 and 20 T-38 aircraft to Tyndall AFB would be managed in accordance with the installation's HWMP.

Environmental Restoration Program - New buildings and structures constructed in association with the beddown of 21 F-22 and 20 T-38 aircraft at Tyndall AFB would accommodate mission-specific activities including deployment processing, munitions storage, and equipment operation and maintenance. In some cases, existing structures would be renovated and/or expanded or new structures would be constructed. The Building 126 addition is within the footprint of the ERP sites designated SS-026 and SS-015 (Figure 4–8. Environmental Restoration Program), both sites have contaminated groundwater. Two groundwater monitoring wells are located southwest of the building and should not be destroyed. If the construction footprint overlaps existing monitoring wells, the wells must be properly abandoned in accordance with the State of Florida's procedures.

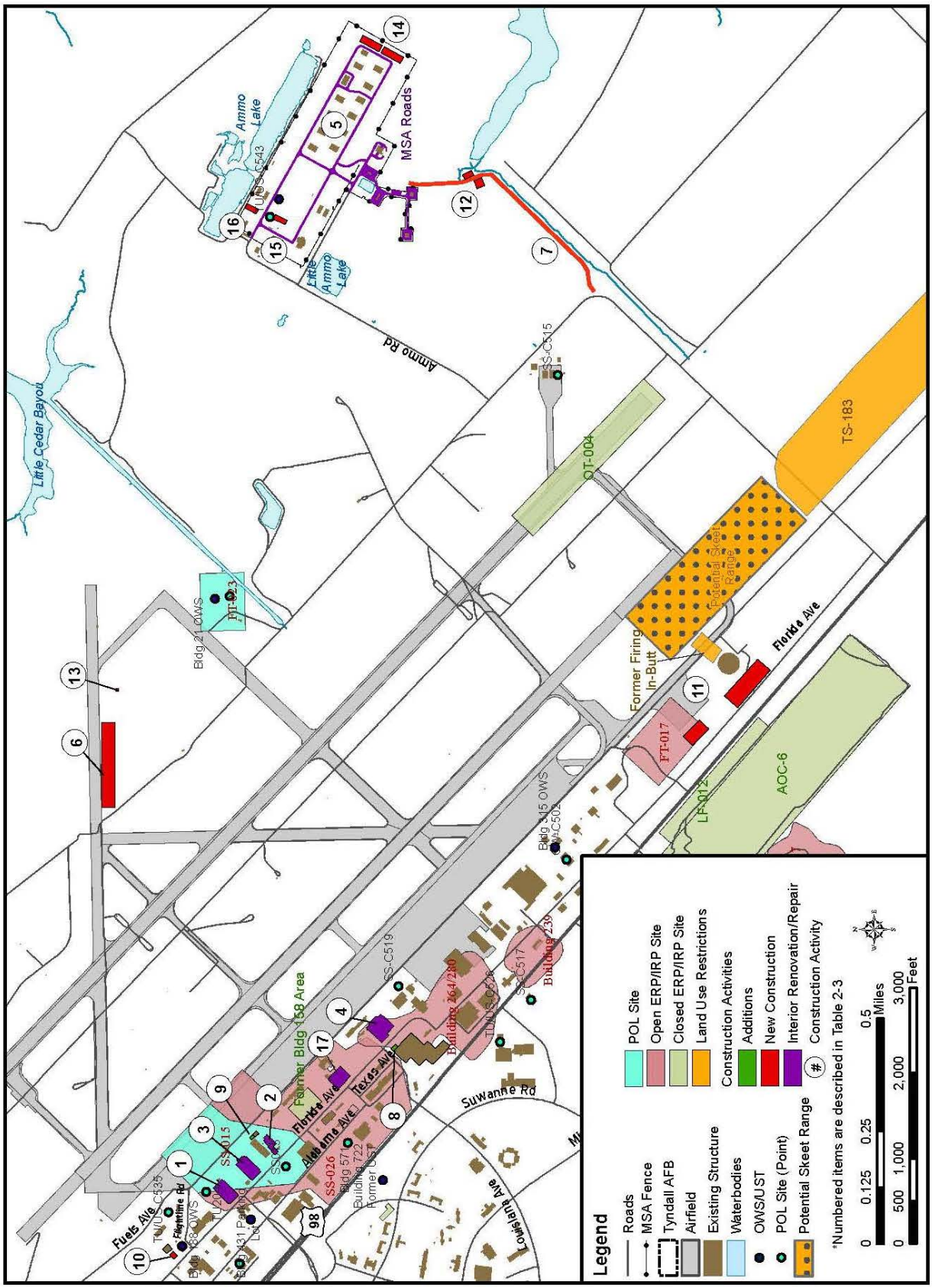

Figure 4–8. Environmental Restoration Program

The Building 266 addition is located close to the boundary of ERP sites SS-026 Vehicle Maintenance Area and Site 264. Both sites have contaminated groundwater. Further delineation/study of groundwater movement could reveal impacts to the proposed construction area. The footprint of the proposed deployment-processing center is located over the ERP site designated OT-027, which is a former drum burial area that was investigated, administratively closed, and consolidated with site FT-017 in 1996 (Tyndall AFB 2009c). In accordance with *HQ AETC/CE Military Construction Guidance – Construction on Environmental Cleanup Sites dated 24 Apr 03* (HQ AETC/CE 2003), an approved waiver for MILCON construction on a contaminated site is required from AETC/Civil Engineering (CE) or ACC/CE depending on the timing of the construction and the major command Tyndall AFB reports to at that time. Additional worker precautions as well as a site-specific health and safety plans approved by a Certified Industrial Hygienist would be required by the waiver.

In addition to known ERP sites, there is the possibility that undocumented contaminated soils from historical fuel spills may be present beneath portions of the base. Any potential impacts associated with unknown contamination would be mitigated through worker awareness and safety training.

Toxic Substances - Prior to any renovation/repair to existing structures associated with the beddown of 21 F-22 and 20 T-38 aircraft at Tyndall AFB, surveys would be conducted to determine the presence of ACM. If ACMs were present, the installation would employ appropriately trained and Florida-licensed contractors to perform the ACM removal work and notify the contractors so that appropriate precautions could be taken to protect the health and safety of the workers. ACM would be segregated for disposal and managed in accordance with applicable federal, state, and local regulations.

Since implementation of the Proposed Action would not materially change the amount of hazardous wastes generated at Tyndall AFB, no significant impacts are anticipated. No significant impacts in regards to ERP sites or toxic substances are anticipated with appropriate waivers and surveys completed as described above.

4.12.3 Alternative 1

Hazardous Materials and Wastes – Potential impacts to hazardous materials and wastes would be the same as those described in the Proposed Action. Therefore, there would be no significant impact for implementation of Alternative 1. Any additional hazardous waste generation or handling areas (e.g., IAPs) that are established due to the beddown of 21 F-22 and 10 T-38 aircraft to Tyndall AFB would be managed in accordance with the installation's HWMP.

Environmental Restoration Program – Construction activities under Alternative 1 would be the same as the Proposed Action. As described in Section 4.12.2, construction on a contaminated site requires an approved waiver from AETC/CE or ACC/CE for MILCON construction projects depending on which major command Tyndall AFB reports to at that time. Additional worker precautions as well as site-specific health and safety plans approved by a Certified Industrial Hygienist would be required by the waiver.

Toxic Substances - As described in Section 4.12.2, prior to any renovation/repair to existing structures surveys would be conducted to determine the presence of ACM. If ACMs were present, the installation would employ appropriately trained and Florida-licensed contractors to perform the ACM removal work and notify the contractors of the presence of ACM so that appropriate precautions could be taken to protect the health and safety of the workers. ACM would be segregated for disposal and managed in accordance with applicable federal, state, and local regulations.

Since implementation of Alternative 1 would not materially change the amount of hazardous wastes generated at Tyndall AFB, no significant impacts are anticipated. No significant impacts in regards to ERP sites or toxic substances are anticipated with appropriate waivers and surveys completed as described above.

4.12.4 No Action Alternative

Under the No Action Alternative, the beddown of F-22 and T-38 aircraft at Tyndall AFB would not occur. The generation of waste at Tyndall AFB would experience no change from current levels.

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5 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.1 Cumulative Effects Analysis

The CEQ regulations stipulate that the cumulative effects analysis in an EA considers the potential environmental consequences resulting from "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Chapter 3 discusses the baseline conditions for environmental resources at Tyndall AFB and in the training airspace. Chapter 4 discusses potential consequences at the base and under the training airspace associated with the F-22 operational squadron and the T-38 detachment beddown. Chapter 5 identifies past, present, and reasonably foreseeable projects that could cumulatively affect environmental resources in conjunction with the beddown and the use of the training airspace.

Assessing cumulative effects begins with defining the scope of other project actions and their potential interrelationship with the Proposed Action and Alternative 1 (CEQ 1997). The scope must consider other projects that coincide with the location and timetable of the Proposed Action, Alternative 1, and other actions. Cumulative effects analyses evaluate the interactions of multiple actions.

The CEQ (1997) identified and defined eight ways in which effects can accumulate: time crowding, time lag, space crowding, cross boundary, fragmentation, compounding effects, indirect effects, and triggers and thresholds. Furthermore, cumulative effects can arise from single or multiple actions, and through additive or interactive processes (CEQ 1997).

Actions not part of the proposal, but that could be considered actions connected in time or space (40 CFR 1508.25) (CEQ 1997), may include projects that affect areas on or near Tyndall AFB and projects underlying the affected training airspace. This EA analysis addresses three questions to identify cumulative effects:

1. Does a relationship exist such that elements of the project alternatives might interact with elements of past, present, or reasonably foreseeable actions?
2. If one or more of the elements of the alternatives and another action could be expected to interact, would the alternative affect, or be affected by, impacts of the other action?
3. If such a relationship exists, does an assessment reveal any potentially significant impacts not identified when the alternative is considered alone?

An effort has been made to identify major actions that have already occurred, that are being considered, or are currently in the planning phase. To the extent that details regarding such actions exist and the actions have a potential to interact with the proposal, these actions are included in this cumulative analysis. This approach enables decision-makers to have the most

current information available so they can evaluate the environmental consequences of the Proposed Action and Alternative 1.

5.1.1 Past, Present, and Reasonably Foreseeable Actions

This EA provides decision-makers with the cumulative effects of the Proposed Action as well as the incremental contribution of past, present, and reasonably foreseeable actions. Recent past and ongoing military action in the region were considered as part of the baseline or existing condition in Chapter 3.

5.1.1.1 Tyndall AFB and Other Military Actions

Tyndall AFB is an active military installation that experiences continuous and rapid evolution of mission and training requirements. This process of change is consistent with the U.S. defense policy that U.S. Military Forces must be ready to respond to threats to American interests throughout the world.

Tyndall AFB, like other major military installations, regularly requires new construction, facility improvements, and infrastructure upgrades. In addition, Table 5–1 lists past, present, and potential future major military projects occurring in the region. Each project was reviewed to consider the implications of each action and its synergy with the proposed F-22 and T-38 beddown. Of particular interest were potential overlap in affected area and project timing. The projects listed on Table 5–1 have the potential to interact in time or location with the proposed F-22 and T-38 beddown.

5.1.1.2 Non-Federal Actions

Non-Federal actions include major public and private projects within the ROI. Bay County is a large urban area with multiple construction projects occurring. However, no actions have been identified that would occur near Tyndall AFB or the underlying training airspace.

5.1.2 Cumulative Effects Analysis

5.1.2.1 Airspace Management and Use

Several independent studies reveal that the challenges presented by the regional airspace utilization and congestion are growing due to changes and interactions among both military and civilian requirements. The airspace in the Northwest Florida region is heavily used by a number of military, commercial, and general aviation interests. The Gulf Regional Airspace Strategic Initiative (GRASI) was completed to provide recommendations for the deconflicting of schedules and airspace use among all users of airspace in Northwest Florida. The GRASI demonstrated that the BRAC 2005 directed beddown of F-35s at Eglin AFB would interact with F-22s based at Tyndall AFB. Both aircraft would use similar special use airspace, especially W-151 and W-470. While there may be competition for airspace, it is not believed that it would significantly impact either mission.

Table 5–1. Past, Present, and Reasonably Foreseeable Actions

Action	Document	Description
Tyndall AFB		
General Plan Construction Projects and Improvements	General Plan-Based EIAP Environmental Assessment, September 2009. (Tyndall AFB 2009b)	This action included proposed construction, demolition, and renovation of facilities and infrastructure at Tyndall AFB to improve operational effectiveness, correct deficiencies, and replace inadequate facilities. Specific projects were identified in the Capital Improvement Plan identified in the General Plan. A few of the projects included are construction of a new 120-person dormitory, a new six-bay hangar, visitors quarters and billeting, as well as demolition of headquarters administrative offices, cadet quarters, and the family support center.
Alternate Drone Launch System	Construction and Operation of an Alternate Drone Launch System at Tyndall AFB Environmental Assessment, May 2008 (Tyndall AFB 2008b)	The Proposed Action involves the construction and operation of an alternate drone launch system adjacent to the eastern side of the drone launch facility at Tyndall AFB. The proposed system would be used by the 53 WEG to launch BQM-167A subscale aerial target drones to support the AFSAT program. The BQM-167A subscale aerial target drone is used by the Air Force to test and develop various types of weapons systems. The clear area footprint of the launch system would be 3.7 acres with a rail track system. As under the current program, at the end of the launch mission, either the drone would return to the existing drone recovery area at the base to parachute for recovery, or it would parachute over water for an aquatic recovery by the Drone Water Recovery Work Center.
Munitions Storage Area Addition	Environmental Assessment for the Munitions Storage Area Addition at Tyndall AFB, n.d. (Tyndall AFB n.d.)	This action expanded the Munitions Storage Area by adding up to seven new facilities, one building addition, and additional parking for a total disturbance of approximately 18,385 SF. The facilities were sited to be located on uplands and minimize the impact to the surrounding wetlands.
QF-4 to QF-16 Conversion	Environmental Analysis to be conducted at a future date	This action would convert aging QF-4 aircraft with QF-16 aircraft to continue the drone mission at Tyndall AFB. The QF-16 aircraft are expected to continue in the same airspace and operations tempo as the current QF-4 mission. The conversion is anticipated to begin in FY14. To date, NEPA analysis has not yet been completed.
Other Military Actions		
Eglin BRAC Final EIS, 2009	Proposed Implementation of the BRAC 2005 Decisions and Related Actions at Eglin AFB, Florida. February 2009. (Air Force 2009)	The BRAC Commission in 2005 recommended Eglin AFB, FL, as the beddown location for the F-35 Joint Strike Fighter Integrated Training Center (ITC), which would provide training in the F-35 for all military branches. The F-35 would utilize airspace units also used by Tyndall AFB. In particular, W-151 and the Tyndall MOAs are proposed for use by the F-35 as well as the F-22 operational squadron. Since the ROD on the Eglin BRAC EIS has been signed, providing up to 59 F-35 aircraft to Eglin AFB, the flight operations from these F-35 aircraft in W-151 and the Tyndall MOAs are included as part of the baseline analysis.
Eglin BRAC Supplemental EIS, 2010	Eglin Base Realignment and Closure Draft Supplemental Environmental Impact Statement, September 2010. (Air Force 2010b)	This Supplemental EIS examines additional basing options within the Eglin AFB reservation for the F-35 ITC. Proposed flight operations of the F-35 in the training airspace remain the same as those described in the Eglin BRAC Final EIS date February 2009, with 59 F-35 aircraft. In the Supplemental EIS, the use of Tyndall AFB and NAS Pensacola as Practice Instrument Approach Fields by the F-35 is proposed. Approximately 5 to 10 operations per day are expected.

Action	Document	Description
GOMEX EIS, December 2010	GOMEX Range Complex Final Environmental Impact Statement/Overseas Environmental Impact Statement, December 2010. (DON 2010)	The U.S. Navy prepared the GOMEX EIS to assess the 10-year planning horizon of Navy operations in the GOMEX Range Complex. The GOMEX Range Complex includes offshore surface and subsurface operations areas and overlying special use airspace, including W-151 and W-155. Actions considered in the Proposed Action include increased training tempos in Navy or joint training opportunities, the elimination of mine warfare training events, increase in air-to-surface bombing exercises and gunnery exercises using only inert weapons, and an increase in the commercial air services support acting as opposition forces and electronic warfare training,
GRASI 2011	Gulf Regional Airspace Strategic Initiative (GRASI), 2011. (GRASI 2011)	GRASI is a joint effort between the DoD, FAA, and regional airports in the Florida/GOMEX region to manage and schedule the region's airspace to accommodate all users to the maximum extent possible. Recommendations are included in a Gulf Regional Airspace Plan and include adjusting procedures for air traffic control, creating additional ATCAAs to ease congestion, establish an alert area encompassing the Tyndall MOAs notifying pilots of intensive use by student pilots, and coordination on scheduling the airspace between the various stakeholders. NEPA analysis has not yet been conducted for the implementation of these recommendations by the Air Force.

Key:

AFB = Air Force Base
AFSAT = Air Force Subscale Aerial Target
ATCAA = Air Traffic Control Assigned Airspace
BRAC = Base Realignment and Closure
DoD = Department of Defense
EIAP = Environmental Impact Analysis Process
EIS = Environmental Impact Statement
FAA = Federal Aviation Administration
GOMEX = Gulf of Mexico
GRASI = Gulf Regional Airspace Strategic Initiative
ITC = Integrated Training Center
MOA = Military Operations Area
NAS = Naval Air Station
n.d. = no date
ROD = Record of Decision
WEG = Weapons Evaluation Group

Several techniques would be used to alleviate potential conflicts or congestion. Altitude separation within the SUA is one technique. The F-22s would be flying at altitudes above typical F-35 missions, possibly leading to dual (and more efficient) use of SUA. GRASI also identified that more efficient coordinated scheduling between Eglin AFB and Tyndall AFB would prevent over scheduling, decrease conflicts, and provide a more efficient use of SUA. Additionally, among the GRASI recommendations is the establishment of two new high altitude ATCAAs. If these ATCAAs are created in coordination with the FAA, the ATCAAs may be used by the operational and training F-22 squadrons and the T-38 detachment. The use of the ATCAAs by the F-22s and T-38s may reduce the amount of congestion experienced in the warning areas and the air traffic control region shared by multiple civilian airports.

Eglin is currently in the process of updating their scheduling timeline process to increase the amount of time from initial request to actual mission flight. Extending the time would allow early identification of conflicts in the process and work towards a resolution sooner.

The Air Force is in the process of a nation-wide roll out of the Central Scheduling Enterprise (CSE) program. CSE, currently used by Eglin AFB but not Tyndall AFB, would enable both bases to see and schedule the regional airspace and identify conflicts when the request is made. It is also believed that the incremental arrival of both the F-22 and the F-35 would allow early identification of potential issues and obtain solutions before they become a significant impact.

The Eglin Supplemental EIS proposes Tyndall AFB and NAS Pensacola as fields for practicing instrument approach by F-35 aircraft to reduce demand and congestion at other airfields. The expected daily use of Tyndall AFB by the F-35 aircraft would be five to ten operations per day. It is not anticipated that this would have a significant impact on the Tyndall AFB ATC system. The F-35 operations would be on a case-by-case basis and as allowed by ATC traffic.

None of the alternatives proposed would have a significant cumulative impact on ATC operations. ATC manning authorizations have not changed since the departure of the F-15s and additional manning requirements are not anticipated with any of the alternatives. It is anticipated that if the alternative to bring 21 F-22s and 20 T-38 aircraft were selected, the ATC operations would be close to Tyndall AFB's historic level of operations.

5.1.2.2 Noise

Practice approaches to Tyndall AFB runways by F-35 aircraft based at Eglin AFB would slightly increase time-averaged noise levels at and near Tyndall AFB. However, as described in the *Eglin Base Realignment and Closure Draft Supplemental EIS* (Air Force 2010b), F-35 aircraft would conduct only five to ten operations per day on average. The transient F-35 operations would occur in the context of approximately 320 aircraft operations per day on average that would be occurring under the Proposed Action. Cumulative impacts associated with transient F-35 operations would be expected to be minor and insignificant.

F-35 operations in airspace were included in the *Final EIS for Proposed Implementation of the BRAC 2005 Decisions and Related Actions at Eglin AFB* (Air Force 2009) and included as part of baseline conditions noise analysis in this EA. Any changes to F-35 training operations in airspace described in the *Final EIS for Proposed Implementation of the BRAC 2005 Decisions and*

Related Actions at Eglin AFB that would result in changes to airspace noise levels would be covered in subsequent versions of the *Eglin Base Realignment and Closure Draft Supplemental EIS*.

5.1.2.3 Safety

Construction projects contained in the General Plan Improvement Project list would have a positive impact on ground safety by eliminating airfield criteria violations to UFC 3-260-01. The MSA expansion allows for additional storage of training munitions in accordance with DDESB and Air Force explosive safety standards. While the Eglin F-35 beddown would add additional aircraft to the airspace, airspace initiatives such as GRASI would improve overall flight safety by enhancing coordination and deconfliction among the multiple users of the airspace.

5.1.2.4 Air Quality

Air quality would be temporarily impacted by construction activities occurring concurrently. The emissions from construction are expected to be minimal and would have little overall affect on regional air quality. The implementation of the Eglin BRAC would cause a cumulative, ongoing increase in emissions from aircraft operations at Tyndall AFB. The number of F-35 operations occurring at Tyndall AFB compared to Eglin AFB is 2 percent (maximum) and there were no significant impacts to air quality at Eglin AFB; thus, it is reasonable to assume no significant impacts from F-35 air operations would occur in conjunction with Tyndall AFB air operations.

5.1.2.5 Physical Resources

Planned and reasonably foreseeable actions associated with construction, renovation, and improvement activities of the Proposed Action and Alternative 1 have the potential to increase the likelihood of erosion by exposure of soils through mechanical grading, removal of vegetation, and an increase in impervious surfaces. The use of standard construction practices before, during, and after such activities, as well as compliance with applicable Air Force, federal, state, and local regulations and/or requirements would minimize any impacts to soil. These planned and foreseeable activities may also result in an increase in the likelihood of erosion by exposure of soils and thus may impact stormwater runoff. The use of stormwater and spill prevention standard construction practices would minimize the potential impact associated with construction, renovation, and improvement activities such as runoff. Thus, there would be no significant impacts associated with physical resources due to the Proposed Action or Alternative 1 in combination with the actions listed in Table 5–1.

5.1.2.6 Biological Resources

Terrestrial Biological Resources - Localized loss of habitat, degradation of habitat, noise impacts, or direct physical impacts to species can have a cumulative impact when viewed on a regional scale if that loss or impact is compounded by other events with the same result. Analysis of potential impacts has identified minimal potential for significant impacts to terrestrial biological resources, which includes vegetation, wildlife, threatened and endangered species and their habitat, and wetlands, provided Tyndall AFB implements management actions and standard construction practices identified in this EA. Review of associated environmental documents listed in Table 5–1 indicates that construction activities would

primarily occur within already developed areas of the base or in upland areas to minimize impacts to surrounding wetlands. Sediment and erosion control measures would be implemented to prevent or minimize indirect impacts to surrounding wetlands and all construction activities would adhere to management recommendations provided in Tyndall AFB's SWPPP and standard construction practices. The *Munitions Storage Area Addition EA* identified minor impacts to wetlands and the requirement for a joint FDEP/USACE Dredge and Fill Permit application for road crossings over storm ditches. New construction projects would likely displace wildlife into adjacent suitable habitat and noise from construction activities would be temporary and intermittent. No significant impacts to vegetation, wildlife, threatened and endangered species or wetlands were identified in available environmental analyses. Therefore, no significant cumulative impacts are anticipated from past, present and foreseeable future construction projects.

Air operations could cumulatively impact biological resources in the region if sound levels significantly increase or airspace is reconfigured. Currently, projected air operations would occur in the existing airspace configuration. Any species present under the Tyndall MOA flight paths may be exposed to sound exposure levels up to 116 dB from F-22 and up to 109 dB from T-38 flights at 500 feet AGL. The loudest overflight event currently occurring regularly under Tyndall MOAs is 116 dB SEL at 300 feet AGL, as generated by F-15 aircraft. The Eglin BRAC Final EIS indicated that sound exposure levels up to 133 dB at 300 feet AGL are expected to occur under the Tyndall MOA flight paths from future Eglin AFB F-35 flight operations. However, no significant impacts to biological species were identified in the associated analyses. Significant cumulative impacts to biological resources from air operations are not expected.

Marine Biological Resources - Subsonic and supersonic flight of F-22 and T-38 aircraft would incrementally contribute to noise in the marine environment of the northeastern Gulf of Mexico. Thousands of sorties are flown annually in the EGTTR including flights originating at Eglin AFB. F-35 aircraft would begin training operations in the airspace utilized by Tyndall AFB. F-35 flight operations in the airspace are considered in the baseline noise analysis. In addition to noise produced by aircraft overflights, impulsive noise from ordnance testing and training and tonal noise associated with Navy sonar use is periodically generated in the area. Commercial shipping contributes noise to the marine environment on a regular basis as well. The effects of noise produced by military actions such as flight training, ordnance use, and sonar use are evaluated through the NEPA process and, for actions occurring to date, it has been concluded that such effects do not significantly harm marine biological resources. Future activities would be evaluated through a similar process. It is not likely that the cumulative addition of noise due to the Proposed Action or Alternative 1 described in this document would substantially affect marine resources.

A variety of expendables would enter the marine environment due to the actions described in this document including jet fuel, metals derived from drone fragments, ordnance, chaff, flares, and chemicals such as explosive byproducts and propellants. Other ongoing and future military operations would result in similar items entering the marine environment. In addition, materials, such as those used to construct artificial reefs, are purposely placed in marine waters. The leached metal and chemical constituents of these materials would be diluted to extremely small concentrations by currents, waves, wind, and biological and physical alteration would

occur over time as well. These materials are not expected to harm marine biological resources significantly.

Direct physical impacts to marine species near the water surface may result from falling objects related to ordnance testing and training and air-to-air combat training. These activities are conducted from Eglin AFB as well as Tyndall AFB. Given the relatively small number of objects potentially entering the water compared to the surface area of the warning areas, the dispersed distribution of marine species, and the requirement that animals be near the surface to be impacted, cumulative impacts due to physical strikes are unlikely.

Many construction activities occur in the coastal zone of Florida including military and commercial activities. These actions could potentially contribute to estuarine and marine water quality degradation by the introduction of sediments and pollutants. However, management practices are typically required for such construction activities; therefore, impacts to the marine environment are not expected.

5.1.2.7 Cultural Resources

Damage to the nature, integrity, and spatial context of cultural resources can have a cumulative impact if the initial act is compounded by other similar losses or impacts. The alteration or demolition of historic structures and the disturbance or removal of archaeological artifacts may incrementally impact the cultural and historic setting of Tyndall AFB and the region in general.

None of the proposed beddown activities discussed in this EA was identified as contributing to direct, indirect, or cumulative impacts to archaeological resources or historic resources. The Flightline Area Development Plan at Tyndall AFB calls for renovation and construction surrounding the flightline. One historic structure, Building 156, would require protection or special treatment to avoid or mitigate adverse effects to cultural resources. No other resources would be affected by future activities described in the Tyndall AFB General Plan.

No indirect, direct, or cumulative effects to cultural resources are expected from the Gulf of Mexico Range Complex, the Gulf Regional Airspace Strategic Initiative, the construction, and operation of an Alternate Drone Launch System at Tyndall AFB, or the addition of the Munitions Storage Area at Tyndall AFB.

The potential for pre-WWII (1935) to Cold War era military resources exists in various military facilities on the Florida Panhandle. If impacts to these resources are anticipated due to range activities, plans for the protection or mitigation of these resources must be developed by the affected facilities Cultural Resources Management Office in consultation with the SHPO and other consulting parties as appropriate.

5.1.2.8 Land Use

No cumulative impacts to land use are anticipated from the implementation of the Proposed Action or Alternative 1 in combination with the actions listed in Table 5–1. Construction activities included in the implementation of the General Plan-Based EA would improve land use through the consolidation of compatible land uses and the replacement of old and inadequate facilities. The use of Tyndall AFB as a practice field for instrument approach by the

Eglin AFB F-35s has the potential to increase the noise levels currently experienced near the Tyndall AFB airfield. However, with the small number of proposed F-35 operations per day (5 to 10 operations) in addition to the proposed F-22, T-38, QF-4, and other aircraft currently or proposed to be based at Tyndall AFB, it is not expected that noise levels would increase to the extent that land uses would become incompatible or that recreation would be impacted.

5.1.2.9 Socioeconomics

Activities described in Table 5–1 would involve construction, facility improvements, and infrastructure upgrades, which would provide additional beneficial impacts to the local economy from the use of local labor and supplies. These activities would be temporary and minor, lasting only the duration of the construction and renovation activities, and therefore would not be anticipated to result in cumulative impacts.

In addition, no personnel changes are anticipated to occur within Bay County associated with the activities described in Table 5–1 so there would be no anticipated changes to population, housing, and increased need for community services, such as school resources.

5.1.2.10 Environmental Justice

There would be no anticipated cumulative impacts to Environmental Justice areas from construction activities. Construction projects described in Table 5–1 would not be anticipated to create disproportionately high and adverse human health or environmental effects to minority or low-income populations. Construction and renovation activities would occur within the boundaries of Tyndall AFB and would not impact off-base populations. Actions included in the Eglin BRAC Final EIS have been included in baseline conditions and do not pose a cumulative impact to Environmental Justice. The use of Tyndall AFB as a practice field for instrument approaches by the F-35s as evaluated in the Draft Eglin BRAC Supplemental EIS has the potential to increase noise affecting off-base residents. However, with only five to ten operations per day expected, it is not anticipated that the change in noise levels would be sufficient to have disproportionate high and adverse impacts to Environmental Justice areas.

5.1.2.11 Infrastructure

The proposed construction associated with the Proposed Action and Alternative 1, as well as those described in Section 5.1.1, would result in temporary minor hindrance of transportation and circulation during construction activities. These impacts would be temporary, occurring only for the duration of the construction activities. Additionally, new construction would follow LEED strategies and green specifications resulting in reduced energy usage and lessening the additional load on the electrical supply system. Cumulative impacts to infrastructure are not expected to be significant.

5.1.2.12 Hazardous Materials and Waste Management

Planned and foreseeable construction, renovation, and demolition activities within Tyndall AFB would result in short-term increases in the volume of hazardous wastes generated at the installation. Wastes generated from military activities would continue to be managed in accordance with applicable regulations and approved plans. Air Force regulations require

contractors to recycle materials to the maximum extent possible to reduce the amount of debris disposed of at off-installation landfills. Planned and foreseeable construction, renovation, and demolition activities within Tyndall AFB could cumulatively impact available landfill capacity. However, due to available landfill capacity at the two approved off-installation landfill facilities, there should be no significant cumulative impacts to solid wastes. Therefore, no significant cumulative impacts are anticipated.

Hazardous materials and wastes would be handled, stored, and disposed of in accordance with applicable regulations. If contractors were to encounter contaminated materials such as ACM or petroleum contaminated soils, they would be required to stop work and contact the appropriate personnel on Tyndall AFB. Any ACM, LBP, or contaminated soils associated with ERP sites would be removed and disposed of per applicable regulations.

5.2 Other Environmental Considerations

5.2.1 Relationship between Short-Term Uses and Long-Term Productivity

CEQ regulations (Section 1502.16) specify that environmental analysis must address "…the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity". Special attention should be given to impacts that narrow the range of beneficial uses of the environment in the long-term or pose a long-term risk to human health or safety. This section evaluates the short-term benefits of the proposal compared to the long-term productivity derived from not pursuing the proposal.

Short-term effects to the environment are generally defined as a direct consequence of a project in its immediate vicinity. Short-term effects could include localized disruptions and higher noise levels in some areas. The military training that occurs in the airspace results in noise effects that are transitory in nature. Such noise effects would be short-term and would not be expected to result in permanent or long-term changes in wildlife or habitat use. Under the F-22 and T-38 beddown, these short-term changes would have a negligible cumulative effect.

5.2.2 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored due to the action.

For Tyndall AFB, most impacts are short-term and temporary (such as air emissions from operations) or longer lasting (such as noise). Air Force aircraft and personnel would use fuel, oil, and lubricants in normal activities. Training operations would involve consumption of nonrenewable resources, such as gasoline used in vehicles, and jet fuel used in aircraft. Training would also involve commitment of chaff and flares. None of these activities would be expected to significantly decrease the availability of minerals or petroleum resources or have cumulative environmental consequences.

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Appendix A Public and Agency Outreach

A.1 Sample IICEP Letters

The following sections provide samples of the various types of IICEP letters sent to the list of recipients provided in Section A.3.

A.1.1 Sample Letter - Fish and Wildlife Services

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
JOINT BASE LANGLEY-EUSTIS VIRGINIA

MEMORANDUM FOR: Fish and Wildlife Research Institute
Florida Fish and Wildlife
Conservation Commission
100 Eighth Avenue SE
St. Petersburg, FL 33701-5095

FROM: Colonel Dimasalang F. Junio
Chief, Programs Division (A7)
129 Andrews St
Langley AFB, VA 23665

SUBJECT: F-22 and T-38A Beddown at Tyndall Air Force Base, Florida

1. The United States Air Force (Air Force) is in the process of preparing an Environmental Assessment (EA) at Tyndall Air Force Base (AFB), Florida (FL) to assess the potential environmental consequences associated with the beddown of 21 F-22 Primary Aircraft Authorized (PAA) and up to 20 T-38A PAA. Alternatives to the Proposed Action will include an alternative with 21 F-22 PAA and 10 T-38A PAA and the No Action Alternative in which no aircraft would beddown.

2. The Proposed Action would include facility renovations and expansions along the Tyndall AFB primary flightline as well as new construction within the Munitions Storage Area (MSA) located northeast of the primary flightline. In addition to facility renovation and construction, the F-22s and T-38As would operate within existing airspace including overland Military Operations Areas (MOAs), Air Traffic Control Assigned Airspace (ATCAA), and over water Warning Areas. The accompanying maps identify the general region of influence for construction and renovation activities and airspace to be used by the F-22s and T-38As.

3. The EA for the Proposed Action will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321-4347), the Council on Environmental Quality (CEQ) NEPA Regulations (40 Code of Federal Regulations [CFR] 1500-1508), and the Air Force's Environmental Impact Analysis Process (EIAP) 32 CFR 989. Pursuant to the Endangered Species Act and NEPA, we are requesting information regarding federally listed or proposed species that may be present in the potentially affected area. Until the extent of the potential impact to listed species is determined, we will make no decision regarding the need for a Section 7 consultation.

4. If you have any specific items of interest about the proposal, we would like to hear from you within 30 days of receipt of this letter. Please contact the EA Project Manager, Mr. Nick Germanos, at HQ ACC/A7PS, 129 Andrews St, Langley AFB, VA 23665 or at (757) 764-9334 with any questions or concerns that you or your staff may have. Thank you for your assistance in this matter.

Sincerely,

DIMASALANG F. JUNIO, Colonel, USAF
Chief, Programs Division A7

Attachments: Maps of Facility Projects and Airspace

Global Power For America

A.1.2 Sample Letter - Elected Officials

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
JOINT BASE LANGLEY-EUSTIS VIRGINIA

The Honorable Greg Evers
Florida Senate
308 Senate Office Building
404 South Monroe Street
Tallahassee, FL 32399

Dear Senator Evers,

The United States Air Force (Air Force) is in the process of preparing an Environmental Assessment (EA) at Tyndall Air Force Base (AFB), Florida (FL) to assess the potential environmental consequences associated with the beddown of 21 F-22 Primary Aircraft Authorized (PAA) and up to 20 T-38A PAA. Alternatives to the Proposed Action will include an alternative with 21 F-22 PAA and 10 T-38A PAA and the No Action Alternative in which no aircraft would beddown.

The Proposed Action would include facility renovations and expansions along the Tyndall AFB primary flightline as well as new construction within the Munitions Storage Area (MSA) located northeast of the primary flightline. In addition to facility renovation and construction, the F-22s and T-38As would operate within existing airspace including overland Military Operations Areas (MOAs), Air Traffic Control Assigned Airspace (ATCAA), and over water Warning Areas. The accompanying maps identify the general region of influence for construction and renovation activities and airspace to be used by the F-22s and T-38As.

The EA for the Proposed Action will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321-4347), the Council on Environmental Quality (CEQ) NEPA Regulations (40 Code of Federal Regulations [CFR] 1500-1508), and the Air Force's Environmental Impact Analysis Process (EIAP) 32 CFR 989. As part of this EA, we request your assistance in identifying potential areas of environmental impact to be addressed.

If you have any specific items of interest about the proposal, we would like to hear from you within 30 days of receipt of this letter. Please contact the EA Project Manager, Mr. Nick Germanos, at HQ ACC/A7PS, 129 Andrews St, Langley AFB, VA 23665 or at (757) 764-9334 with any questions or concerns that you or your staff may have. Thank you for your assistance in this matter.

Sincerely,

DIMASALANG F. JUNIO, Colonel, USAF
Chief, Programs Division A7

Attachments: Maps of Facility Projects and Airspace

Global Power For America

A.1.3 Sample Letter - Tribal Representatives

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
JOINT BASE LANGLEY-EUSTIS VIRGINIA

Robert Thrower
Tribal Historic Preservation Officer
Poarch Band of Creek Indians
5811 Jack Springs Road
Ardmore, AL 36502

Dear Robert Thrower,

The United States Air Force (Air Force) is in the process of preparing an Environmental Assessment (EA) at Tyndall Air Force Base (AFB), Florida (FL) to assess the potential environmental consequences associated with the beddown of 21 F-22 Primary Aircraft Authorized (PAA) and up to 20 T-38A PAA. Alternatives to the Proposed Action will include an alternative with 21 F-22 PAA and 10 T-38A PAA and the No Action Alternative in which no aircraft would beddown.

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The EA for the Proposed Action will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321-4347), the Council on Environmental Quality (CEQ) NEPA Regulations (40 Code of Federal Regulations [CFR] 1500-1508), and the Air Force's Environmental Impact Analysis Process (EIAP) 32 CFR 989. As part of this EA and in compliance with Section 106 of the National Historic Preservation Act, the Air Force will consider any concerns you might have. We request you identify any concerns you may have about the potential effects of the proposal on significant cultural resources.

If you have any specific items of interest about the proposal, we would like to hear from you within 30 days of receipt of this letter. Please contact the EA Project Manager, Mr. Nick Germanos, at HQ ACC/A7PS, 129 Andrews St, Langley AFB, VA 23665 or at (757) 764-9334 with any questions or concerns that you or your staff may have. Thank you for your assistance in this matter.

Sincerely,

DIMASALANG F. JUNIO, Colonel, USAF
Chief, Programs Division A7

Attachments: Maps of Facility Projects and Airspace

Global Power For America

A.1.4 Sample Letter - Members of Congress

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
JOINT BASE LANGLEY-EUSTIS VIRGINIA

Congressman Steve Southerland
US House of Representatives
1229 Longworth HOB
Washington, DC 20515

Dear Congressman Southerland,

The United States Air Force (Air Force) is in the process of preparing an Environmental Assessment (EA) at Tyndall Air Force Base (AFB), Florida (FL) to assess the potential environmental consequences associated with the beddown of 21 F-22 Primary Aircraft Authorized (PAA) and up to 20 T-38A PAA. Alternatives to the Proposed Action will include an alternative with 21 F-22 PAA and 10 T-38A PAA and the No Action Alternative in which no aircraft would beddown.

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The EA for the Proposed Action will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321-4347), the Council on Environmental Quality (CEQ) NEPA Regulations (40 Code of Federal Regulations [CFR] 1500-1508), and the Air Force's Environmental Impact Analysis Process (EIAP) 32 CFR 989. As part of this EA, we request your assistance in identifying potential areas of environmental impact to be addressed.

If you have any specific items of interest about the proposal, we would like to hear from you within 30 days of receipt of this letter. Please contact the EA Project Manager, Mr. Nick Germanos, at HQ ACC/A7PS, 129 Andrews St, Langley AFB, VA 23665 or at (757) 764-9334 with any questions or concerns that you or your staff may have. Thank you for your assistance in this matter.

DAVE C. HOWE
Brigadier General, USAF
Director of Installations and Mission Support

Attachments: Maps of Facility Projects and Airspace

Global Power For America

A.1.5 Sample Letter - General

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
JOINT BASE LANGLEY-EUSTIS VIRGINIA

MEMORANDUM FOR DISTRIBUTION

FROM: Colonel Dimasalang F. Junio
Chief, Programs Division (A7)
129 Andrews St
Langley AFB, VA 23665

SUBJECT: F-22 and T-38A Beddown at Tyndall Air Force Base, Florida

1. The United States Air Force (Air Force) is in the process of preparing an Environmental Assessment (EA) at Tyndall Air Force Base (AFB), Florida (FL) to assess the potential environmental consequences associated with the beddown of 21 F-22 Primary Aircraft Authorized (PAA) and up to 20 T-38A PAA. Alternatives to the Proposed Action will include an alternative with 21 F-22 PAA and 10 T-38A PAA and the No Action Alternative in which no aircraft would beddown.

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3. The EA for the Proposed Action will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321-4347), the Council on Environmental Quality (CEQ) NEPA Regulations (40 Code of Federal Regulations [CFR] 1500-1508), and the Air Force's Environmental Impact Analysis Process (EIAP) 32 CFR 989. As part of this EA, we request your assistance in identifying potential areas of environmental impact to be addressed.

4. If you have any specific items of interest about the proposal, we would like to hear from you within 30 days of receipt of this letter. Please contact the EA Project Manager, Mr. Nick Germanos, at HQ ACC/A7PS, 129 Andrews St, Langley AFB, VA 23665 or at (757) 764-9334 with any questions or concerns that you or your staff may have. Thank you for your assistance in this matter.

Sincerely,

DIMASALANG F. JUNIO, Colonel, USAF
Chief, Programs Division A7

Attachments: Maps of Facility Projects and Airspace

A.2 Comments Received from IICEP Letters

OFFICE OF PLANNING AND BUDGET

Nathan Deal
Governor

Debbie Dlugolenski
Director

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Mr. Nick Germanos
HQ ACC/A7PS
129 Andrews Street
Langley AFB, VA 23665

FROM: Barbara Jackson
Georgia State Clearinghouse

DATE: February 22, 2011

SUBJECT: Preliminary solicitation for comments to be included in EA
F-22 and T-38A Beddown at Tyndall AFB (Florida)

I received your request concerning the above-referenced on February 22, 2011. However, Georgia State Clearinghouse itself does not have the knowledge or expertise to provide input concerning environmental issues. Our primary function will be to coordinate processing of this project once you are ready to submit the EA to us. Once ready, please submit one cover letter/memo and 6 CDs.

I have taken the initiative to forward on your correspondence about the project to several of our reviewing agencies, asking them to respond to you directly. However, I must inform you that some agencies may opt to wait and review the EA itself through Clearinghouse's intergovernmental review process.

/bj

Office: 404-656-3855

AN EQUAL OPPORTUNITY EMPLOYER
270 Washington Street, S.W., Atlanta, Georgia 30334

Fax: 770-344-3568

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. Nick Germanos
Department of the Air Force
HQ ACC/A7PS
129 Andrews Street
Langley AFB, Virginia 23665

February 25, 2011

RE: DHR Project File Number: 2011-682
Preparation of an Environmental Assessment for the F-22 and T-38 Beddown
Tyndall Air Force Base, Bay County

Dear Mr. Germanos:

This office reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places.* The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, *36 CFR Part 800: Protection of Historic Properties* and the *National Environmental Policy Act of 1969*, as amended.

Tyndall Air Force Base contains several historic buildings and archaeological sites which may be impacted by the proposed undertaking. We look forward to receiving and reviewing the draft environmental assessment for the *F-22 and T-38 Beddown* at Tyndall Air Force Base and coordinating in the protection and preservation of significant historic and prehistoric resources.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservationist, by electronic mail *sedwards@dos.state.fl.us*, or at 850.245.6333.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office
(850) 245.6300 • FAX: 245.6436

☐ Archaeological Research
(850) 245.6444 • FAX: 245.6452

☑ Historic Preservation
(850) 245.6333 • FAX: 245.6437

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
(727) 824-5317; FAX 824-5300
http://sero.nmfs.noaa.gov

March 1, 2011 F/SER46:VB/mt

Mr. Nick Germanos
HQ ACC/A7PS
129 Andrews St,
Langley AFB, VA 23665-2701

Dear Mr. Germanos:

NOAA's National Marine Fisheries Services, Habitat Conservation Division, (NMFS-HCD) has received the memorandum dated February 16, 2011 regarding the F-22- and T-38A beddown at the Tyndall Air Force Base in Bay County, Florida. The proposed action includes new construction and repairs of existing structures along the facility's primary flightline and Munitions Storage Area (MSA).

The NMFS-HCD does not believe the project will directly impact NOAA's trust resources; however, a portion of the alternate MSA egress route is adjacent to a tidally influenced ditch that drains into Little Cedar Bayou and its connected St. Andrews Bay. Our concerns in regards to this project are the effects from runoff and construction operations on the estuarine habitats of St. Andrews Bay. The construction, repairs and use of the alternate MSA egress route could lead to an increase in the activities along the ditch and in the amounts of sediment and pollutants entering the estuarine habitats utilized by federally managed marine fisheries. Therefore, NMFS-HCD recommends that measures be taken to prevent degraded water, sediment, debris, and pollutants from entering the ditch and the St. Andrews Bay system. In addition, best management practices should be employed for all pre and post construction operations to prevent impacts to the contiguous estuarine habitats.

If you have questions regarding these comments, please contact Veronica Beech at our Panama City office or at 850-234-5061.

Sincerely,

W. Mark Thompson

for Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

Clay County
Board of Commissioners

105 North Washington Street
P.O. Box 519
Fort Gaines, GA 39851
Ofc: 229.768.3238 Fax: 229.768.3672
Web: www.claycountyga.org

March 14, 2011

Mr. Nick Germanos
EA Project Manager
HQ ACC/A7PS
129 Andrews Street
Langley AFB, VA 23665

Dear Mr. Germanos;

As per your request, the Clay County Board of Commissioners and its citizens have identified the following potential areas of environmental impact for MOAs effecting Clay County, GA.

1. Citizens prefer no sonic boom in area of lake homes
2. Clay County is home to Lake Water F. George, a recreation reservoir. We have many ultra lights, crop dusters and pleasure aircraft in the area, we request caution be used when flying in the MOA.
3. Clay County is home to many nesting Eagles along the shoreline, citizens have expressed concerns for disturbance during nesting season.
4. Fishermen have concerns about low flying aircraft over lake.

We appreciate your consideration for our community and its citizens, if you need any other information, please feel free to call me at (229) 768-3238 ext 7 or e-mail me at administrator@claycountyga.org.

Sincerely,

Spencer Mueller
County Administrator

Clay County is an equal opportunity service provider and employer.

Florida Department of Environmental Protection
Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Jennifer Carroll
Lt. Governor

Herschel T. Vinyard, Jr.
Secretary

April 1, 2011

Mr. Nick Germanos
HQ ACC/A7PS
Department of the Air Force
129 Andrews Street
Langley AFB, VA 23665

RE: Department of the Air Force – Scoping Notice – F-22 and T-38A Aircraft Beddown Alternatives at Tyndall Air Force Base – Bay County, Florida.
SAI # FL201102215661

Dear Mr. Germanos:

The Florida State Clearinghouse has coordinated a review of the referenced scoping notice under the following authorities: Presidential Executive Order 12372; § 403.061(40), *Florida Statutes*; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

The Florida Department of Environmental Protection's (DEP) Northwest District Office in Pensacola notes that, based upon a review of the notice, state and federal regulations concerning asbestos are applicable to the building renovations or demolitions planned at Tyndall Air Force Base. These regulations are listed in Chapter 62-257, *Florida Administrative Code*, and 40 C.F.R. Part 61, Subpart M. The following actions are to be taken prior to commencing renovation or demolition activities:

- A thorough inspection of the building or structure for the presence and types of asbestos containing materials before initiating renovation or demolition work. In Florida, a Florida Licensed Asbestos Consultant must conduct the inspection.
- Written notification of any demolition (even if there is no asbestos in the structure), or renovation that could disturb regulated amounts of asbestos containing material, to the DEP at least 10 working days before beginning work by completing and submitting the DEP Notice of Asbestos Renovation or Demolition.
- Removal of regulated asbestos containing materials by a Florida licensed asbestos contractor before initiating work that could disturb the asbestos containing material.

Mr. Nick Germanos
April 1, 2011
Page 2 of 2

Please contact Ms. Carol Melton, Compliance Section Supervisor for the Northwest District's Air Resources Management Section, at (850) 595-0616 if you have any questions or require additional information.

The Florida Department of State (DOS) notes that Tyndall Air Force Base has several historic buildings and archaeological sites that may be affected by the proposed project. Staff looks forward to receiving and reviewing the draft EA and coordinating in the protection and preservation of significant historic and prehistoric resources. Please refer to the enclosed DOS letter.

Based on the information contained in the scoping notice and the enclosed state agency comments, the state has determined that, at this stage, the proposed activities are consistent with the Florida Coastal Management Program (FCMP). To ensure the project's continued consistency with the FCMP, the concerns identified by our reviewing agencies must be addressed prior to project implementation. The state's continued concurrence will be based on the activity's compliance with FCMP authorities, including federal and state monitoring of the activity to ensure its continued conformance, and the adequate resolution of issues identified during this and subsequent reviews. The state's final concurrence of the project's consistency with the FCMP will be determined during the environmental permitting process in accordance with Section 373.428, *Florida Statutes*.

Thank you for the opportunity to review the proposed project. Should you have any questions regarding this letter, please contact Ms. Jillian Schatzman at (850) 245-2187.

Yours sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/js
Enclosures

cc: Darryl Boudreau, DEP, Northwest District
Sally Cooey, DEP, Panama City Branch Office
Laura Kammerer, DOS

Categories

Florida
Department of Environmental Protection
"More Protection, Less Process"

DEP Home | OIP Home | Contact DEP | Search | DEP Site Map

Project Information	
Project:	FL201102215661
Comments Due:	03/25/2011
Letter Due:	04/07/2011
Description:	DEPARTMENT OF THE AIR FORCE - SCOPING NOTICE - F-22 AND T-38A AIRCRAFT BEDDOWN ALTERNATIVES AT TYNDALL AIR FORCE BASE - BAY COUNTY, FLORIDA.
Keywords:	USAF - F-22 AND T-38A AIRCRAFT BEDDOWN ALTERNATIVES AT TYNDALL AFB - BAY CO.
CFDA #:	12.200

Agency Comments:
WEST FLORIDA RPC - WEST FLORIDA REGIONAL PLANNING COUNCIL
Released Without Comment
BAY - BAY COUNTY
No Comments
FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
NO COMMENT BY TED HOEHN ON 3/18/2011.
STATE - FLORIDA DEPARTMENT OF STATE
DOS notes that Tyndall Air Force Base has several historic buildings and archaeological sites that may be affected by the proposed project. Staff looks forward to receiving and reviewing the draft EA and coordinating in the protection and preservation of significant historic and prehistoric resources.
TRANSPORTATION - FLORIDA DEPARTMENT OF TRANSPORTATION
The FDOT Aviation Office and District Three have no comments.
ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
The DEP Northwest District Office in Pensacola notes that, based upon a review of the notice, state and federal regulations concerning asbestos are applicable to the building renovations or demolitions planned at Tyndall Air Force Base. These regulations are listed in Chapter 62-257, F.A.C., and 40 C.F.R. Part 61, Subpart M. The following actions are to be taken prior to commencing renovation or demolition activities: -- A thorough inspection of the building or structure for the presence and types of asbestos containing materials before initiating renovation or demolition work. In Florida, a Florida Licensed Asbestos Consultant must conduct the inspection. -- Written notification of any demolition (even if there is no asbestos in the structure), or renovation that could disturb regulated amounts of asbestos containing material, to the DEP at least 10 working days before beginning work by completing and submitting the DEP Notice of Asbestos Renovation or Demolition. -- Removal of regulated asbestos containing materials by a Florida licensed asbestos contractor before initiating work that could disturb the asbestos containing material. Please contact Ms. Carol Melton, Compliance Section Supervisor for the Northwest District's Air Resources Management Section, at (850) 595-0616 if you have any questions or require additional information.
NORTHWEST FLORIDA WMD - NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT
No comments/consistent

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Ms. Lauren Milligan
Director, Florida State Clearinghouse
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, Mail Station 47
Tallahassee, Florida 32399-3000

RECEIVED
MAR 14 2011
DEP Office of
Intergovt'l Programs

March 9, 2011

RE: DHR Project File Number: 2011-778
SAI #: 201102215661C
Department of the Air Force
Scoping Notice for the F-22 and T-38 Beddown Alternatives at Tyndall Air Force Base
Bay County

Dear Ms. Milligan:

Our office reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places*, or otherwise of historical, architectural or archaeological value. The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended and *36 CFR Part 800: Protection of Historic Properties* and the implementing state regulations.

Tyndall Air Force Base contains several historic buildings and archaeological sites which may be impacted by the proposed undertaking. We look forward to receiving and reviewing the draft environmental assessment for the *F-22 and T-38 Beddown* at Tyndall Air Force Base and coordinating in the protection and preservation of significant historic and prehistoric resources.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservationist, by electronic mail *sedwards@dos.state.fl.us*, or at 850.245.6333.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245.6300 • FAX: 245.6436
☐ Archaeological Research (850) 245.6444 • FAX: 245.6452
☑ Historic Preservation (850) 245.6333 • FAX: 245.6437

A.3 Intergovernmental Coordination for Environmental Planning (IICEP) Mailing List

A.3.1 Mailing List - Fish and Wildlife Services

Last Name	First Name	Title/Office	Agency	Street Address	City	State	Zip
Keys	David	Southeast Region Office, NEPA Coordinator	NOAA Fisheries Service, Southeast Regional Office	263 13th Avenue South	St. Petersburg	FL	33701
Mizzi	Janet	Panama City Ecological Services Field Office	U.S. Fish and Wildlife Service	1601 Balboa Ave	Panama City	FL	32405
Thompson	Mark		National Marine Fisheries Service	3500 Delwood Beach Road	Panama City	FL	32408
		Fish and Wildlife Research Institute	Florida Fish and Wildlife Conservation Commission	100 Eighth Ave SE	St. Petersburg	FL	33701-5095
		Wildlife Resources Division	Georgia Department of Natural Resources	2070 U.S. Hwy 278, SE	Social Circle	GA	30025
		Georgia Historic Preservation Division	Georgia Department of Natural Resources	254 Washington Street, SW, Ground Level	Atlanta	GA	30334
			NOAA Fisheries, Office of Habitat Conservation	1315 East-West Highway, SSMC3, 14th Floor F/HC	Silver Spring	MD	20910
		West Georgia Sub Office	U.S. Fish and Wildlife Service	PO Box 52560	Ft Benning	GA	31995

A.3.2 Mailing List - Elected Officials

Last Name	First Name	Title/Office	Agency	Street Address	City	State	Zip
Cathey	Al	Mayor	City of Mexico Beach	PO Box 13425	Mexico Beach	FL	32410
Clemmons	The Honorable Scott	Mayor	Panama City Commission	9 Harrison Ave	Panama City	FL	32402
Coley	The Honorable Marti	Representative	Florida House of Representatives	319 The Capitol, 402 South Monroe Street	Tallahassee	FL	32399
Evers	The Honorable Greg	Senator	Florida Senate	308 Senate Office Building, 404 South Monroe Street	Tallahassee	FL	32399
Gaetz	Senator Don	Senator	Florida Senate	420 Senate Office Building, 404 South Monroe Street	Tallahassee	FL	32399
Hammons	Kenneth R.	City Manager	City of Panama City	9 Harrison Ave	Panama City	FL	32402
Jackson	Richard E.	City Manager	City of Panama City Beach	104 S. Arnold Road	Panama City Beach	FL	32413
Montford	Senator Bill	Senator	Florida Senate	208 Senate Office Building, 404 South Monroe Street	Tallahassee	FL	32399
Moron	Michael	Board Secretary	Franklin County Commissioners	33 Market Street, Suite 203	Apalachicola	FL	32320
Oberst	The Honorable Gayle	Mayor	The City of Panama City Beach	110 S. Arnold Road	Panama City Beach	FL	32413

Last Name	First Name	Title/Office	Agency	Street Address	City	State	Zip
Patronis	The Honorable Jimmy	Representative	Florida House of Representatives	1102 The Capitol, 402 South Monroe Street	Tallahassee	FL	32399
			Bay County Chamber of Commerce	235 West 5th Street, P.O. Box 1850	Panama City	FL	32402-1850
			Bay County Planning and Zoning	840 West 11th Street	Panama City	FL	32401
			Board of County Commissioners-Bay County	840 W 11th St	Panama City	FL	32401
		County Commissioners	Calhoun County	PO Box 226	Morgan	GA	39866
			Calhoun County Commissioners-Clerk of Court	20859 Central Ave. E Room 130	Blountstown	FL	32424
		City Council	City of Bainbridge	PO Box 158	Bainbridge	GA	39818
			City of Blakely	PO Box 350	Blakely	GA	39823
		City Council	City of Bristol	PO Box 207	Bristol	FL	32321
		City Council	City of Chipley	1442 Jackson Avenue	Chipley	FL	32428
		City Council	City of Donalsonville	PO Box 308	Donalsonville	GA	39845
		City Commissioners	City of Marianna	PO Box 936	Marianna	FL	32447
		City Council	City of Mexico Beach	PO Box 13425	Mexico Beach	FL	32410
		County Commissioners	Clay County	105 Washington Street N, County Courthouse	Fort Gaines	GA	39851
		County Commissioners	Decatur County	PO Box 726	Bainbridge	GA	39818
		County Commissioners	Early County	PO Box 693	Blakely	GA	39823
			Gulf County Board of County Commissioners	1000 Cecil G. Costin, Sr. Blvd	Port St. Joe	FL	32456
		Board of County Commissioners	Jackson County	2864 Madison Street	Marianna	FL	32448
		Board of County Commissioners	Liberty County	PO Box 399	Bristol	FL	32321
		County Commissioners	Miller County	155 S. First Street, County Courthouse	Colquitt	GA	39837
		County Commissioners	Quitman County	PO Box 114	Georgetown	GA	39854
		County Commissioners	Randolph County	PO Box 221	Cuthbert	GA	39840
		County Commissioners	Seminole County	200 S Knox Ave, County Courthouse	Donalsonville	GA	39845
		Board of County Commissioners	Washington County	1331 South Blvd	Chipley	FL	32428

A.3.3 Mailing List - Tribal Representatives

Last Name	First Name	Title/Office	Agency	Street Address	City	State	Zip
Bear	Joyce A.	Manager Cultural Preservation	Muscogee (Creek) Nation	P.O. Box 580	Okmulgee	OK	74447
Bowlegs	Pare	Historic Preservation Officer	Seminole Nation of Oklahoma	P.O. Box 1498	Wewoka	OK	74884
Carleton	Kenneth	Historic Preservation Officer	Mississippi Band of Choctaw Indians	P.O. Box 6257	Choctaw	MS	39350
Cole	Terry	Cultural Resources	Choctaw Nation of Oklahoma	Post Office Drawer 1210	Durant	OK	74702
Nail	Gingy	Historic Preservation Officer	Chickasaw Nation of Oklahoma	P.O. Box 1548	Ada	OK	74821-1548
Steele	Bill	Tribal Historic Preservation Officer	Seminole Tribe of Florida	Attn: Museum; 1 Seminole Hotel	Hollywood	FL	33024
Steven	Terry	Historic Preservation Officer	Miccosukee Tribe of Indians of Florida	Post Office Drawer 440021	Miami	FL	33144
Thrower	Robert	Tribal Historic Preservation Officer	Poarch Band of Creek Indians	5811 Jack Springs Road	Ardmore	AL	36502

A.3.4 Mailing List - Members of Congress

Last Name	First Name	Title/Office	Agency	Street Address	City	State	Zip
Nelson	Senator Bill	Senator	U.S. Senate	United States Senate, 716 Senate Hart Office Building	Washington	D.C.	20510
Nelson	Senator Bill	Senator	U.S. Senate	US Court House Annex, 111 North Adams Street	Tallahassee	FL	32301
Rubio	Senator Marco	Senator	U.S. Senate	United States Senate, B40A Dirksen Senate Office Building	Washington	D.C.	20510
Rubio	Senator Marco	Senator	U.S. Senate	1 N Palafax Street, Suite 159	Pensacola	FL	32502
Southerland	Steve	Congressman	U.S. House of Representatives	1229 Longworth HOB	Washington	D.C.	20515
Southerland	Steve	Congressman	U.S. House of Representatives	840 W 11th Street, Suite 2250	Panama City	FL	32401

A.3.5 Mailing List - General

Last Name	First Name	Title/Office	Agency	Street Address	City	State	Zip
Curtis	Randy	Executive Director	Panama City-Bay County Airport and Industrial District	6300 West Bay Parkway	Panama City Beach	FL	32409
Jackson	Barbara		Georgia State Clearinghouse	270 Washington Street, SW, 8th Floor	Atlanta	GA	30334
Kammerer	Laura	Historic Preservationist Supervisor	Florida Department of State Division of Historical Resources	500 S. Bronough Street	Tallahassee	FL	32399-0250
Marcham	Lee Mr.	Bureau Chief	NW Florida Water Management District	The Delaney Center, Suite 2D, 2252 Killearn Center Blvd	Tallahassee	FL	32309
Milligan	Laura		Florida State Clearinghouse	3900 Commonwealth Blvd, Mail Station 47	Tallahassee	FL	32399-3000
Neubauer	Tom	President	Bay Defense Alliance	740 S. Tyndall Parkway	Panama City	FL	32404
Smith	Aaron N.	State Aviation Manager	Florida Department of Transportation	605 Suwannee Street	Tallahassee	FL	32399-0450
			Panama City Community Development	2629 W. 10th St	Panama City	FL	32402
			St. Andrews State Park	4607 State Park Lane	Panama City	FL	32408
			West Florida Regional Planning Council	4081 East Olive Road, Suite A	Pensacola	FL	32514

A.4 Notice of Availability for the Draft EA

The newspaper below includes the Notice of Availability ad that was published in *The News Herald* on Sunday, May 29, 2011 announcing the availability of the Draft EA for public and agency comment.

Joplin death toll 142; 100 missing

JOPLIN, Mo. (AP) — The numbers look increasingly bleak for families hoping for the best after a monster tornado that devastated the town of Joplin, as the city has raised the death toll to at least 142 and state officials say 100 people still are missing.

Thousands more people far beyond Joplin had been waiting for good news about a teen believed to have been ejected or sucked from his vehicle on the way home from graduation. Several social-networking efforts specifically focused on finding information about Will Norton. But his family says he, too, is among the dead — found in a pond near where his truck was located.

"At least we know that he wasn't out there suffering," his aunt Tracey Presslor said, holding a framed portrait of her 18-year-old nephew at a news conference. "Knowing that he was gone right away was really a blessing for us."

The tornado — an EF-5 packing 200 mph winds — was the deadliest since 1950. More than 900 people were injured. Tallying and identifying the dead and the missing has proven a complex, delicate and sometimes confusing exercise for both authorities and loved ones.

Joplin City Manager Mark Rohr said Saturday during a news conference that the death toll rose by three to at least 142. Mike O'Connell, spokesman for the Missouri Department of Public Safety, said Saturday that he could not confirm the city's updated death toll number.

That makes this the deadliest year for tornadoes since 1950, based on an assessment of figures from the National Weather Service. The tornado death toll for 2011 is now 523. Until now, the highest recorded death toll in a single year was 519 in 1953. There were deadlier storms before 1950, but those counts were based on estimates and not on precise figures.

The state has been working to pare down the list of people missing and unaccounted for in the wake of the deadliest single U.S. twister in more than six decades.

melting snow next week would likely swell rivers for even longer, he said.

"Take a little time to breathe today, figure out what you need to do but don't let your guard down," said Cheri Kilby, Disaster and Emergency Coordinator for Fergus County.

Authorities already have started releasing massive volumes of water from overburdened reservoirs. The releases coupled with the floodwaters are predicted to move downstream and causing flooding in the Dakotas, and possibly in Iowa, Nebraska, Kansas and Missouri.

In Bismark, N.D., where the Missouri River was at a flood stage of 16 feet on Saturday, Mayor John Warford said rain and increased water releases from the Garrison Dam had altered flooding models for the region, but he doesn't know how much.

The mayor said the Army Corps of Engineers is recalculating its flooding forecast and should release it early Saturday night. Officials are building levees to protect the city to 21 feet.

North Dakota Gov. Jack Dalrymple also said Saturday that the Federal Emergency Management Agency had expanded its

Crow Chairman Cedric Black Eagle said the tribal government is helping pump water out of flooded basements and clear off roads so families can return and start to repair their homes.

But Black Eagle said he realizes the waters still are high and people might have to leave the reservation again if waters rise.

To the northwest, continued high waters in Roundup were taking their toll.

The small agricultural community seemed to be retaining much of its flood water and the Musselshell River level was hardly declining, said emergency officials. Road closures have cut the town off from all directions but the north.

Director of Disaster and Emergency services for Musselshell County Jeff Gates said people are still stranded around the town. Gates said there is little emergency crews can do at this point but provide people with supplies they need and wait for water to go down.

Gates said that doesn't look to be likely for quite a while.

He is concerned about the town running out of freshwater and residents are being told to conserve as much as they can.

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Notice of Availability
U.S. Air Force Draft Environmental Assessment (EA) for the F-22 Operational Squadron and T-38A Detachment Beddown at Tyndall Air Force Base (AFB), Florida

The U.S. Air Force has prepared a Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI)/Finding of No Practicable Alternative (FONPA) assessing the potential environmental impacts associated with the beddown of one operational squadron of F-22s and one detachment of T-38As.

Proposed Action consists of facility improvements, personnel changes, and changes in flight operations from the beddown of 21 F-22s and up to 20 T-38As to consolidate the F-22 fleet to meet mission responsibilities and to capitalize on the capacity and strategic assets of Tyndall AFB. Facility improvements include renovation or expansion of existing facilities along the flightline. New construction would occur in areas with the potential to disturb wetlands. Flight operations would be conducted in overland Military Operations Areas (MOAs) and offshore Warning Areas currently used by Tyndall AFB-based aircraft. Alternative 1 is the same as the Proposed Action with the exception of the beddown of only 10 T-38As. Under the No Action Alternative, the beddown of the F-22 operational squadron and T-38A detachment would not occur.

Copies of the Draft EA and FONSI are at the Bay County Public Library, 898 West 11th Street, Panama City, FL 32401 and the Tyndall AFB Library, 640 Suwannee Road, Building 916, Tyndall AFB, FL 32403. An electronic copy of the document is also located on Tyndall AFB webpage at http://www.tyndall.af.mil/. You may also request a copy of the document from 325 FW Public Affairs at (850) 283-4500. Please provide any comments on the Draft EA by June 29, 2011 to the address below.

Nick Germanos
HQ ACC/A7PS
129 Andrews Street, Rm 337
Langley AFB, VA 23665-2769

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Panama City, Fl

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20144-1

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For more information, please call
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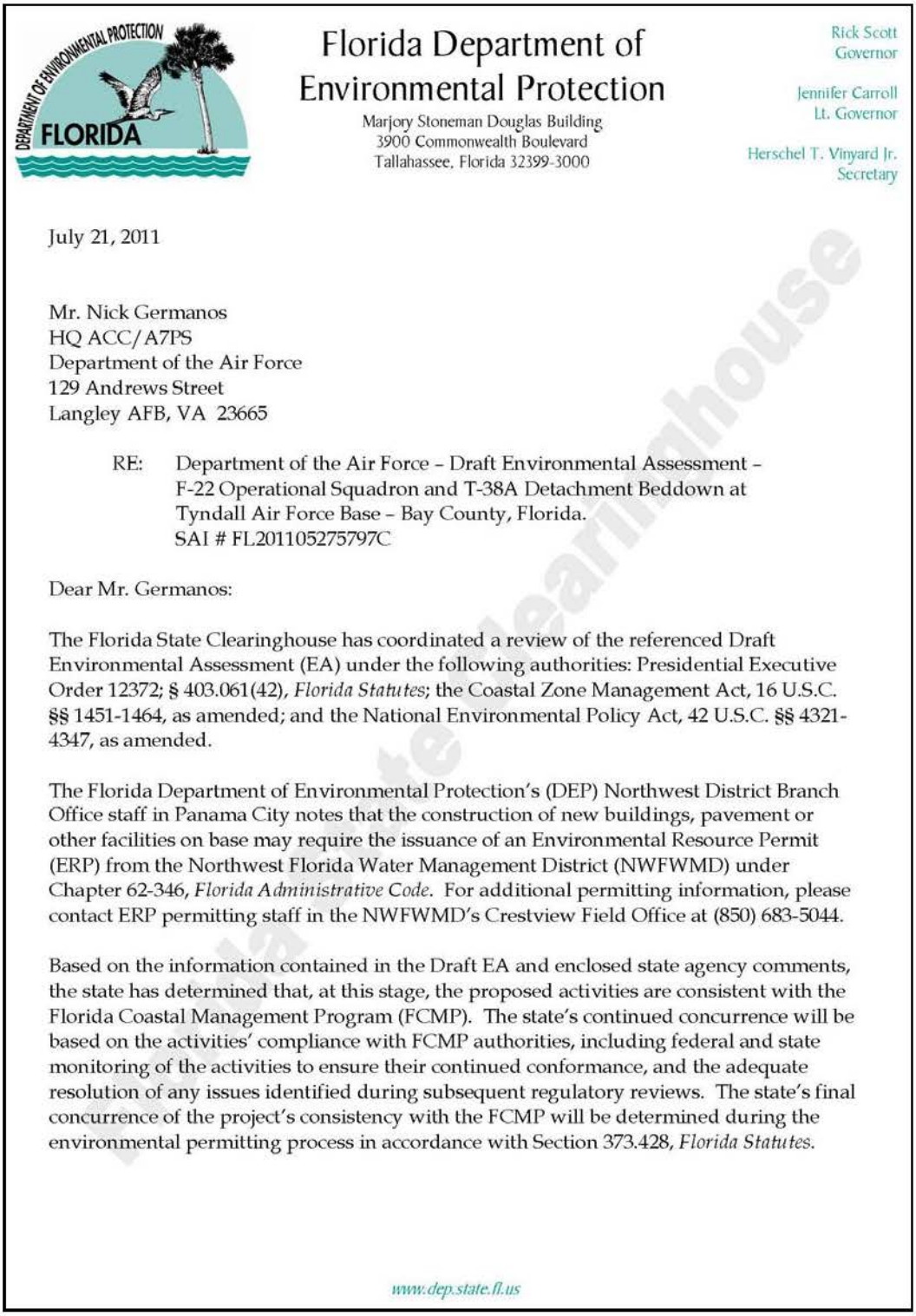
or visit our web site at www.affordabledentures.com

A.5 Public and Agency Comments on the Draft EA

Below are the public and agency comments received on the Draft EA during the review period. No new comments were identified.



Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Jennifer Carroll
Lt. Governor

Herschel T. Vinyard Jr.
Secretary

July 21, 2011

Mr. Nick Germanos
HQ ACC/A7PS
Department of the Air Force
129 Andrews Street
Langley AFB, VA 23665

RE: Department of the Air Force – Draft Environmental Assessment – F-22 Operational Squadron and T-38A Detachment Beddown at Tyndall Air Force Base – Bay County, Florida.
SAI # FL201105275797C

Dear Mr. Germanos:

The Florida State Clearinghouse has coordinated a review of the referenced Draft Environmental Assessment (EA) under the following authorities: Presidential Executive Order 12372; § 403.061(42), *Florida Statutes*; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

The Florida Department of Environmental Protection's (DEP) Northwest District Branch Office staff in Panama City notes that the construction of new buildings, pavement or other facilities on base may require the issuance of an Environmental Resource Permit (ERP) from the Northwest Florida Water Management District (NWFWMD) under Chapter 62-346, *Florida Administrative Code*. For additional permitting information, please contact ERP permitting staff in the NWFWMD's Crestview Field Office at (850) 683-5044.

Based on the information contained in the Draft EA and enclosed state agency comments, the state has determined that, at this stage, the proposed activities are consistent with the Florida Coastal Management Program (FCMP). The state's continued concurrence will be based on the activities' compliance with FCMP authorities, including federal and state monitoring of the activities to ensure their continued conformance, and the adequate resolution of any issues identified during subsequent regulatory reviews. The state's final concurrence of the project's consistency with the FCMP will be determined during the environmental permitting process in accordance with Section 373.428, *Florida Statutes*.

www.dep.state.fl.us

Mr. Nick Germanos
July 21, 2011
Page 2 of 2

Thank you for the opportunity to review the proposed project. Should you have any questions regarding this letter, please contact Ms. Suzanne E. Ray at (850) 245-2172.

Yours sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/ser
Enclosures

cc: Sally Cooey, DEP, Panama City Branch Office

Categories

DEP Home | OIP Home | Contact DEP | Search | DEP Site Map

Project Information	
Project:	FL201105275797C
Comments Due:	07/07/2011
Letter Due:	07/25/2011
Description:	DEPARTMENT OF THE AIR FORCE - DRAFT ENVIRONMENTAL ASSESSMENT - F-22 OPERATIONAL SQUADRON AND T-38A DETACHMENT BEDDOWN AT TYNDALL AIR FORCE BASE - BAY COUNTY, FLORIDA.
Keywords:	USAF - DEA, F-22 OP SQUADRON & T-38A DETACHMENT BEDDOWN, TYNDALL AFB - BAY CO.
CFDA #:	12.200

Agency Comments:
WEST FLORIDA RPC - WEST FLORIDA REGIONAL PLANNING COUNCIL
No Comments
FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
NO COMMENT PER JENNIFER GOFF ON 6/3/11.
STATE - FLORIDA DEPARTMENT OF STATE
No Comment/Consistent
TRANSPORTATION - FLORIDA DEPARTMENT OF TRANSPORTATION
No Comment
ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
The DEP Northwest District Branch Office staff in Panama City notes that the construction of new buildings, pavement or other facilities on base may require the issuance of an Environmental Resource Permit (ERP) from the Northwest Florida Water Management District (NWFWMD) under Chapter 62-346, Florida Administrative Code. For additional permitting information, please contact ERP permitting staff in the NWFWMD's Crestview Field Office at (850) 683-5044.
NORTHWEST FLORIDA WMD - NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT
No Comment/Consistent

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

Visit the Clearinghouse Home Page to query other projects.

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COUNTY: BAY
SCH-106-USAF-TY
2011-2280

DATE: 5/26/2011
COMMENTS DUE DATE: 7/7/2011
CLEARANCE DUE DATE: 7/25/2011
SAI#: FL201105275797C
REFER TO: FL201102215661

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2012 MAY 11 P 3:22
BUREAU OF
HISTORIC PRESERVATION

MESSAGE:

STATE AGENCIES	WATER MNGMNT. DISTRICTS	OPB POLICY UNIT	RPCS & LOC GOVS
ENVIRONMENTAL PROTECTION	NORTHWEST FLORIDA WMD		
FISH and WILDLIFE COMMISSION			
X STATE			
TRANSPORTATION			

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

_ Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.

X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.

_ Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.

_ Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

DEPARTMENT OF THE AIR FORCE - DRAFT ENVIRONMENTAL ASSESSMENT - F-22 OPERATIONAL SQUADRON AND T-38A DETACHMENT BEDDOWN AT TYNDALL AIR FORCE BASE - BAY COUNTY, FLORIDA.

To: Florida State Clearinghouse

AGENCY CONTACT AND COORDINATOR (SCH)
3900 COMMONWEALTH BOULEVARD MS-47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

EO. 12372/NEPA

☑ No Comment
☐ Comment Attached
☐ Not Applicable

Federal Consistency

☑ No Comment/Consistent
☐ Consistent/Comments Attached
☐ Inconsistent/Comments Attached
☐ Not Applicable

From:

Division/Bureau: Division of Historical Resources
Bureau of Historic Preservation

Reviewer: S Edwards DSHPO for Archaeological Services

Date: 6-14-2011 6/14/2011

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. Nick Germanos
Department of the Air Force
HQ ACC/A7PS
129 Andrews Street
Langley AFB, Virginia 23665

June 14, 2011

RE: DHR Project File Number: 2011-2104 (2011-682)
Draft Environmental Assessment for the F-22 and T-38 Beddown
Tyndall Air Force Base, Bay County

Dear Mr. Germanos:

This office reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places*. The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, *36 CFR Part 800: Protection of Historic Properties* and the *National Environmental Policy Act of 1969*, as amended.

We reviewed Sections 3.7 and 4.7, which deal with Cultural Resources of the above referenced draft environmental assessment. Based on the information provided, it is the opinion of this office that the Department of the Air Force has adequately addressed cultural resources.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservationist, by electronic mail *sedwards@dos.state.fl.us*, or at 850.245.6333.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245.6300 • FAX: 245.6436
☐ Archaeological Research (850) 245.6444 • FAX: 245.6452
☑ Historic Preservation (850) 245.6333 • FAX: 245.6437

SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE

TRIBAL HISTORIC
PRESERVATION OFFICE

SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM

30290 JOSIE BILLIE HWY
PMB 1004
CLEWISTON, FL 33440

PHONE: (863) 983-6549
FAX: (863) 902-1117

Nick Germanos, EA Project Manager
HQ ACC/A7PS
129 Andrews Street
Langley AFB, VA 23665

THPO#: 007934

June 22, 2011

Subject: EA for Tyndall Air Force Base Beddown of 21 F-22 PAA and 20 T-38A PAA, Bay County, Florida

Dear Mr. Germanos,

The Seminole Tribe of Florida's Tribal Historic Preservation Office (STOF-THPO) has received the US Department of the Air Force's correspondence concerning the aforementioned project. The STOF-THPO has no objection to your findings at this time. However, the STOF-THPO would like to be informed if cultural resources that are potentially ancestral or historically relevant to the Seminole Tribe of Florida are inadvertently discovered during the construction process. We thank you for the opportunity to review the information that has been sent to date regarding this project. Please reference ***THPO-007934*** for any related issues.

We look forward to working with you in the future.

Sincerely,

Direct routine inquiries to:

Willard Steele
Tribal Historic Preservation Officer
Seminole Tribe of Florida

Anne Mullins
Compliance Review Supervisor
annemullins@semtribe.com

JP:am:ws

[redacted]

From: O'Brien III, David D Civ USAF AETC 325 CES/CEANN [redacted]
Sent: Tuesday, July 12, 2011 11:21 AM
To: Arakelian, Patricia P Civ USAF AETC 325 CES/CEA; Cintron, Jose J Civ USAF AETC 325 CES/CEANC
Cc: Mclernan, Joseph Civ USAF AETC 325 CES/CEA; Baxter, Rachel D.; Germanos, Nicholas M Civ USAF HQ ACC/A7PS; Dischner, David M.
Subject: RE: Ltrs to Indian Tribes for F-22/T-38 Beddown
Signed By: [redacted]

All,

I received a phone call today from Mr. Fred Dayhoff of the Miccosukee Tribe of Indians of Florida. He had received the letter sent last week from CEA, and has no objections to the proposed EA for F-22/T-38 beddown here at Tyndall AFB. He handles all of the NAGPRA and section 106 work for the tribe. As far as getting anything in writing from the tribe, other than verbal concurrence, he stated that it would not happen. He also said that Eglin AFB is in the process of trying to get an MOA in place with the tribes here in Florida, but as far as the Miccosukee Tribe goes there would Not be any written documentation signed by them.

He is in fact a park ranger living with the Indians in Ochopee, Fl. and handles all of their government to government responsibilities. He stated that they had designated him as their speaker because the Miccosukee themselves don't wish to have any "Bad spirits/ Bad blood" brought upon them in response to any NAGPRA related human skeletal remains that may be discovered here at Tyndall AFB or anywhere else. He also expressed to me that he believes that the Air Force and DoD in general are handling themselves very well and thorough, when dealing with consultations and NAPRA related affairs. He commended our work here at Tyndall AFB, but cannot send any written concurrence at this time. Thank You. V/R,

David D. O'Brien III
Cultural Resources Manager

OFFICE OF PLANNING AND BUDGET

Nathan Deal
Governor

Debbie Dlugolenski Alford
Director

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Nick Germanos
HQ ACC/A7PS
Dept. of the Air Force
129 Andrews Street
Langley AFB, VA 23665

FROM: Barbara Jackson BJ
Georgia State Clearinghouse

DATE: 7/5/2011

PROJECT: Draft EA/FONSI: F-22 Operational Squadron and T-38A Detachment Beddown at Tyndall Air Force Base, Florida

STATE ID: GA110601005

The applicant/sponsor indicated that a copy of this project was directly submitted to DNR's Wildlife Resources Division and to DNR's Historic Preservation Division.

The applicant/sponsor is advised that DNR's Environmental Protection Division was included in this review but did not comment within the review period. The agency was contacted, and we received a response that EPD plan to submit any comments within the next week to 10 days. We will forward to you.

bj
Enc.: Southwest Georgia RC, June 6, 2011
GA DOT, June 22, 2011

Form NCC
Oct. 2008

AN EQUAL OPPORTUNITY EMPLOYER
Office: 404-656-3855 270 Washington Street, S.W., Atlanta, Georgia 30334 Fax: 770-344-3568

GA Voicemail Fax
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GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Barbara Jackson
Georgia State Clearinghouse
270 Washington Street, SW, Eighth Floor
Atlanta, Georgia 30334

FROM: MR. DAN BOLINGER
SOUTHWEST GEORGIA RC

APPLICANT: Dept. of the Air Force

PROJECT: Draft EA/FONSI: F-22 Operational Squadron and T-38A Detachment Beddown at Tyndall Air Force Base, Florida

STATE ID: GA110601005

FEDERAL ID:

DATE: 6-6-11

☑ This project is considered to be consistent with those state or regional goals, policies, plans, fiscal resources, criteria for developments of regional impact, environmental impacts, federal executive orders, acts and/or rules and regulations with which this organization is concerned.

This project is not consistent with:

☐ The goals, plans, policies, or fiscal resources with which this organization is concerned. (Line through inappropriate word or words and prepare a statement that explains the rationale for the inconsistency. (Additional pages may be used for outlining the inconsistencies. Be sure to put the GA State ID number on all pages).

☐ The criteria for developments of regional impact, federal executive orders, acts and/or rules and regulations administered by your agency. Negative environmental impacts or provision for protection of the environment should be pointed out. (Additional pages may be used for outlining the inconsistencies. Be sure to put the GA State ID number on all pages).

☐ This project does not impact upon the activities of the organization.

NOTE: Should you decide to FAX this form (and any attached pages), it is <u>not</u> necessary to mail the originals to us. [770-344-3568]

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GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Barbara Jackson
Georgia State Clearinghouse
270 Washington Street, SW, Eighth Floor
Atlanta, Georgia 30334

FROM: AVIATION PROGRAMS
GEORGIA DOT

APPLICANT: Dept. of the Air Force

PROJECT: Draft EA/FONSI: F-22 Operational Squadron and T-38A Detachment Beddown at Tyndall Air Force Base, Florida

STATE ID: GA110601005

FEDERAL ID:

DATE: June 22, 2011

☒ This project is considered to be consistent with those state or regional goals, policies, plans, fiscal resources, criteria for developments of regional impact, environmental impacts, federal executive orders, acts and/or rules and regulations with which this organization is concerned.

This project is not consistent with:

☐ The goals, plans, policies, or fiscal resources with which this organization is concerned. (Line through inappropriate word or words and prepare a statement that explains the rationale for the inconsistency. (Additional pages may be used for outlining the inconsistencies. Be sure to put the GA State ID number on all pages).

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OFFICE OF PLANNING AND BUDGET

Nathan Deal
Governor

Debbie Dlugolenski Alford
Director

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Nick Germanos
HQ ACC/A7PS
Dept. of the Air Force

FROM: Barbara Jackson BJ
Georgia State Clearinghouse

DATE: July 14, 2011

SUBJECT: GA110601005
Draft EA/FONSI: F-22 Operational Squadron and T-38A Detachment Beddown at Tyndall Air Force Base, Florida

Attached comments were received from the reviewing agency after the review period and after the project had been closed out. Although the reviewing agency may have already responded to you directly, I have gone ahead and sent you a copy of their comments for your files. We will retain a copy with our files also.

Thank you.

/bj
Attachment

AN EQUAL OPPORTUNITY EMPLOYER
Office: 404-656-3855
270 Washington Street, S.W., Atlanta, Georgia 30334
Fax: 770-344-3568

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Barbara Jackson
Georgia State Clearinghouse
270 Washington Street, SW, Eighth Floor
Atlanta, Georgia 30334

FROM: MR. F. ALLEN BARNES
GA DNR-EPD DIRECTOR'S OFFICE
F. Allen Barnes

APPLICANT: Dept. of the Air Force

PROJECT: Draft EA/FONSI: F-22 Operational Squadron and T-38A Detachment Beddown at Tyndall Air Force Base, Florida

STATE ID: GA110601005

FEDERAL ID:

DATE: 13 July 2011

☒ This project is considered to be consistent with those state or regional goals, policies, plans, fiscal resources, criteria for developments of regional impact, environmental impacts, federal executive orders, acts and/or rules and regulations with which this organization is concerned.

This project is not consistent with:

☐ The goals, plans, policies, or fiscal resources with which this organization is concerned. (Line through inappropriate word or words and prepare a statement that explains the rationale for the inconsistency. (Additional pages may be used for outlining the inconsistencies. Be sure to put the GA State ID number on all pages).

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Appendix B Aircraft Noise

Noise is generally described as unwanted sound. Unwanted sound can be based on objective effects (such as hearing loss or damage to structures) or subjective judgments (community annoyance). Noise analysis requires a combination of physical measurement of sound, physical and physiological effects, plus psycho- and socio-acoustic effects.

Section B.1 of this appendix describes how sound is measured and summarizes noise impact in terms of community acceptability and land use compatibility. Section B.2 gives detailed descriptions of the effects of noise that lead to the impact guidelines presented in Section 1. Section B.3 provides a description of the specific methods used to predict aircraft noise including a detailed description of sonic booms.

B.1 Noise Descriptors and Impact

Aircraft operating in the Military Operations Areas (MOAs) and warning areas generate two types of sound. One is "subsonic" noise, which is continuous sound generated by the aircraft's engines and by air flowing over the aircraft itself. The other is sonic booms (only in MOAs and warning areas authorized for supersonic flight), which are transient impulsive sounds generated during supersonic flight. These are quantified in different ways.

Section B.1 describes the characteristics that are used to describe sound. Section B.2 describes the specific noise metrics used for noise impact analysis. Section B.3 describes how environmental impact and land use compatibility are judged in terms of these quantities.

B.1.1 Quantifying Sound

Measurement and perception of sound involves two basic physical characteristics: amplitude and frequency. Amplitude is a measure of the strength of the sound and is directly measured in terms of the pressure of a sound wave. Since sound pressure varies in time, various types of pressure averages are usually used. Frequency, commonly perceived as pitch, is the number of times per second the sound causes air molecules to oscillate. Frequency is measured in units of cycles per second, or hertz (Hz).

Amplitude - The loudest sounds the human ear can comfortably hear have acoustic energy one-trillion times the acoustic energy of sounds the ear can barely detect. Due to this vast range, attempts to represent sound amplitude by pressure are generally unwieldy. Sound is therefore, usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as a sound level. The threshold of human hearing is approximately 0 dB and the threshold of discomfort or pain is around 120 dB.

Due to the logarithmic nature of the decibel scale, sounds levels do not add and subtract directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level for example:

60 dB + 60 dB = 63 dB
80 dB + 80 dB = 83 dB

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two for example:

60.0 dB + 70.0 dB = 70.4 dB

Since the addition of sound levels behaves differently than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition". The latter term arises from the fact that combination of decibel values consists of first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

The difference in dB between two sounds represents the ratio of the amplitudes of those two sounds. Since human senses tend to be proportional (i.e., detect whether one sound is twice as big as another is) rather than absolute (i.e., detect whether one sound is a given number of pressure units bigger than another is), the decibel scale correlates well with human response.

Under laboratory conditions, differences in sound level of 1 dB can be detected by the human ear. In the community, the smallest change in average noise level that can be detected is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness and this relationship holds true for loud sounds and for quieter sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound *intensity* but only a 50 percent decrease in perceived *loudness* because of the nonlinear response of the human ear (similar to most human senses).

The one exception to the exclusive use of levels, rather than physical pressure units, to quantify sound is in the case of sonic booms. As described in Section B.3, sonic booms are coherent waves with specific characteristics. There is a long-standing tradition of describing individual sonic booms by the amplitude of the shock waves in pounds per square foot (psf). This is particularly relevant when assessing structural effects as opposed to loudness or cumulative community response. In this study, sonic booms are quantified by either dB or psf as appropriate for the particular impact being assessed.

Frequency - The normal human ear can hear frequencies from about 20 Hz to about 20,000 Hz. It is most sensitive to sounds in the 1,000 to 4,000 Hz range. When measuring community response to noise, it is common to adjust the frequency content of the measured sound to correspond to the frequency sensitivity of the human ear. This adjustment is called A-weighting (ANSI 1988). Sound levels that have been so adjusted are referred to as A-weighted sound levels.

The spectral content of the F-22A is somewhat different from other aircraft including (at high throttle settings) the characteristic nonlinear crackle of high thrust engines. The spectral characteristics of various noises are accounted for by A-weighting, which approximates the response of the human ear. There are other, more detailed, weighting factors that have been applied to sounds. In the 1950s and 1960s, when noise from civilian jet aircraft became an issue, substantial research was performed to determine what characteristics of jet noise was the problem. The metrics Perceived Noise Level and Effective Perceived Noise Level were developed. These accounted for nonlinear behavior of hearing and the importance of low frequencies at high levels and for many years airport/airbase noise contours were presented in

terms of Noise Exposure Forecast, which was based on Perceived Noise Level and Effective Perceived Noise Level. In the 1970s, it was realized that the primary intrusive aspect of aircraft noise was the high noise level, a factor that is well represented by A-weighted levels and L_{dn}. The refinement of Perceived Noise Level, Effective Perceived Noise Level, and Noise Exposure Forecast was not significant in protecting the public from noise.

There has been continuing research on noise metrics and the importance of sound quality sponsored by the Department of Defense (DoD) for military aircraft noise and by the Federal Aviation Administration (FAA) for civil aircraft noise. The metric L_{dnmr}, which accounts for the increased annoyance of rapid onset rate of sound, is a product of this long-term research. DoD is sponsoring the development of NoiseRunner, which will calculate noise in a more sophisticated manner than done by NOISEMAP and MR_NMAP. At present, NOISEMAP, MR_NMAP, and the metrics L_{dn} and L_{dnmr} represent the best current science for analysis of military aircraft.

The amplitude of A-weighted sound levels is measured in dB. It is common for some noise analysts to denote the unit of A-weighted sounds by dBA. As long as the use of A-weighting is understood, there is no difference between dB and dBA. It is only important that the use of A-weighting be made clear. In this Environmental Assessment (EA), sound levels are reported in dB and are A-weighted unless otherwise specified.

A-weighting is appropriate for continuous sounds, which are perceived by the ear. Impulsive sounds, such as sonic booms, are perceived by more than just the ear. When experienced indoors, there can be secondary noise from rattling of the building and vibrations may be felt. C-weighting (ANSI 1988) is applied to such sounds. This is a frequency weighting that is flat over the range of human hearing (about 20 Hz to 20,000 Hz) and rolls off above and below that range. In this study, C-weighted sound levels are used for the assessment of sonic booms and other impulsive sounds. As with A-weighting, the unit is dB, but dBC is sometimes used for clarity. In this study, sound levels are reported in dB, and C-weighting is specified as necessary.

Time Averaging - Sound pressure of a continuous sound varies greatly with time so it is customary to deal with sound levels that represent averages over time. Levels presented as instantaneous (i.e., as might be read from the dial of a sound level meter) are based on averages of sound energy over either 1/8 second (fast) or 1 second (slow). The formal definitions of fast and slow levels are somewhat complex, with details that are important to the makers and users of instrumentation. They may be thought of as levels corresponding to the root mean-square sound pressure measured over the 1/8-second or 1-second periods.

The most common uses of the fast or slow sound level in environmental analysis is in the discussion of the maximum sound level that occurs from the action and in discussions of typical sound levels. Figure B 1 is a chart of A-weighted sound levels from typical sounds. Some (air conditioner, vacuum cleaner) are continuous sounds whose levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle pass by. Some (urban daytime, urban nighttime) are averages over some extended period. A variety of noise metrics has been developed to describe noise over different periods. These are described in Section B.2.

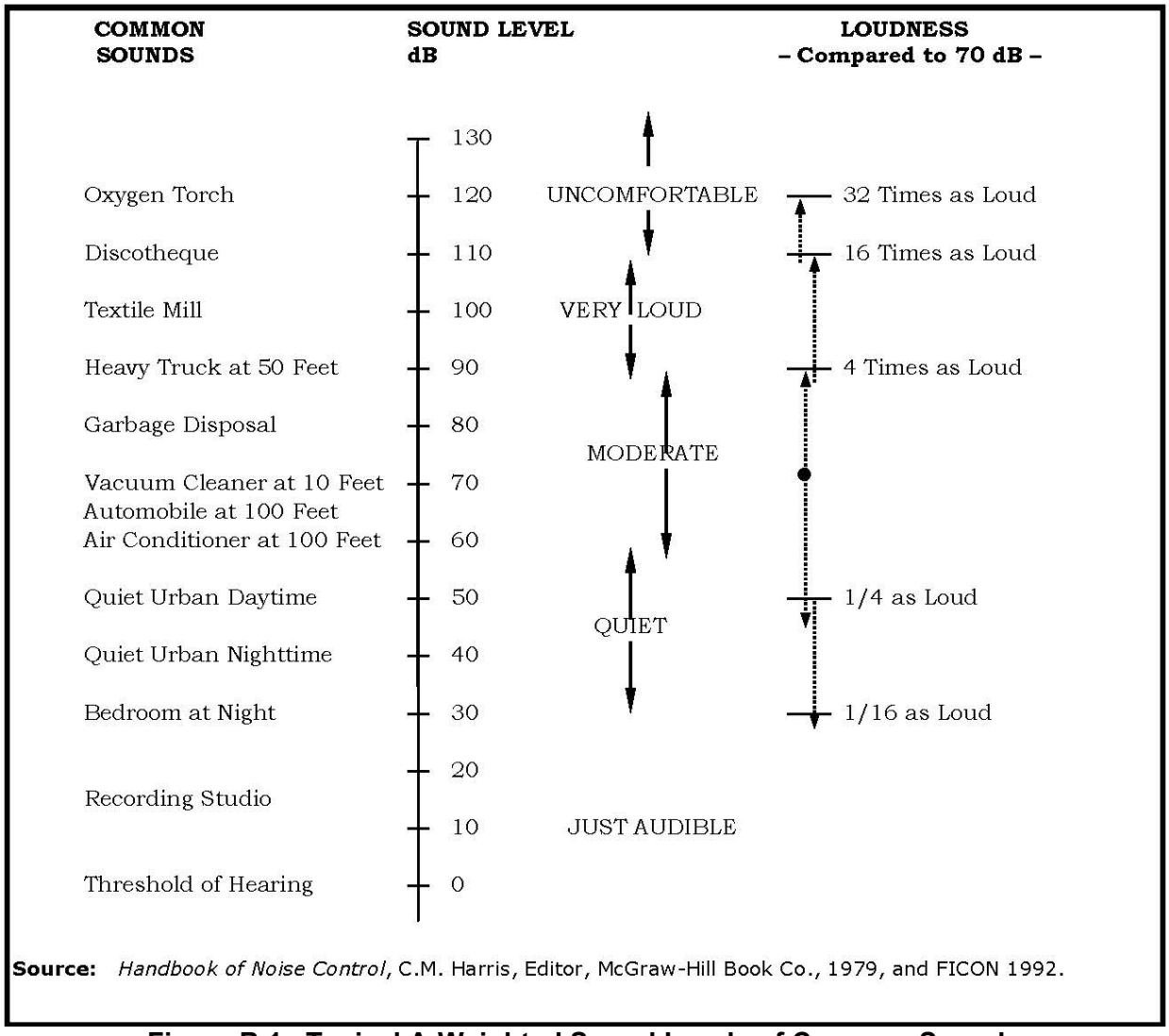


Figure B 1. Typical A-Weighted Sound Levels of Common Sounds

B.2 Noise Metrics

B.2.1 Maximum Sound Level

The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. It is usually abbreviated by ALM, L_{max}, or L_{Amax}. The maximum sound level is important in judging the interference caused by a noise event with conversation, listening to the TV or radio, sleeping, or other common activities.

B.2.2 Peak Sound Level

For impulsive sounds, the true instantaneous sound pressure is of interest. For sonic booms, this is the peak pressure of the shock wave as described in Section 3.2 of this appendix. This pressure is usually presented in physical units of psf. Sometimes it is represented on the decibel scale, with symbol L_{pk}. Peak sound levels do not use either A or C weighting.

B.2.3 Sound Exposure Level

Individual time-varying noise events have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. Although the maximum sound level, described above, provides some measure of the intrusiveness of the event, it alone does not completely describe the total event. The period of time during which the sound is heard is also significant. The Sound Exposure Level (abbreviated SEL or L_{AE} for A-weighted sounds) combines both of these characteristics into a single metric.

SEL is a composite metric that represents both the intensity of a sound and its duration. Mathematically, the mean square sound pressure is computed over the duration of the event and then multiplied by the duration in seconds and the resultant product is turned into a sound level. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. It has been well established in the scientific community that SEL measures this impact much more reliably than just the maximum sound level.

Since the SEL and the maximum sound level are both used to describe single events, there is sometimes confusion between the two, so the specific metric used should be clearly stated.

SEL can be computed for C-weighted levels (appropriate for impulsive sounds) and the results denoted CSEL or L_{CE}. SEL for A-weighted sound is sometimes denoted ASEL. Within this study, SEL is used for A-weighted sounds and CSEL for C-weighted.

B.2.4 Equivalent Sound Level

For longer periods, total sound is represented by the equivalent continuous sound pressure level (L_{eq}). L_{eq} is the average sound level over some period (often an hour or a day, but any explicit time span can be specified), with the averaging being done on the same energy basis as used for SEL. SEL and L_{eq} are closely related, differing by (a) whether they are applied over a specific period or over an event, and (b) whether the duration of the event is included or divided out.

Just as SEL has proven to be a good measure of the noise impact of a single event, L_{eq} has been established to be a good measure of the impact of a series of events during a given period. In addition, while L_{eq} is defined as an average, it is effectively a sum over that period and is, thus, a measure of the cumulative impact of noise.

B.2.5 Day-Night Average Sound Level

Noise tends to be more intrusive at night than during the day. This effect is accounted for by applying a 10-dB penalty to events that occur after 10 PM and before 7 AM. If L_{eq} is computed over a 24-hour period with this nighttime penalty applied, the result is the day-night average sound level (L_{dn}). L_{dn} is the community noise metric recommended by the U.S. Environmental Protection Agency (USEPA 1974) and adopted by most federal agencies (FICON 1992). It has been well established that L_{dn} correlates well with community response to noise (Schultz 1978; Finegold *et al.* 1994). This correlation is presented in Section B.3.1 of this appendix.

While L_{dn} carries the nomenclature "average", it incorporates all of the noise at a given location. For this reason, L_{dn} is often referred to as a "cumulative" metric. It accounts for the total, or cumulative, noise impact.

It was noted earlier that, for impulsive sounds, C-weighting is more appropriate than A-weighting. The day-night average sound level can be computed for C-weighted noise and is denoted L_{cdn} or L_{Cdn}. This procedure has been standardized and impact interpretive criteria similar to those for L_{dn} have been developed (CHABA 1981).

B.2.6 Onset-Adjusted Monthly Day-Night Average Sound Level

Aircraft operations in military airspace, such as MOAs and warning areas, generate a noise environment somewhat different from other community noise environments. Overflights are sporadic, occur randomly, and vary from day to day and week to week. This situation differs from most community-type noise environments where noise tends to be continuous or patterned. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset.

To represent these differences, the conventional L_{dn} metric is adjusted to account for the "surprise" effect of the sudden onset of aircraft noise events on humans (Plotkin *et al.* 1987; Stusnick *et al.* 1992; Stusnick *et al.* 1993). For aircraft exhibiting a rate of increase in sound level (called onset rate) of from 15 to 150 dB per second, an adjustment or penalty ranging from 0 to 11 dB is added to the normal SEL. Onset rates above 150 dB per second require an 11 dB penalty, while onset rates below 15 dB per second require no adjustment. The L_{dn} is then determined in the same manner as for conventional aircraft noise events. It is then designated as Onset-Rate Adjusted Day-Night Average Sound Level (abbreviated L_{dnmr}). Due to the irregular occurrences of aircraft operations, the number of average daily operations is determined by using the calendar month with the highest number of operations. The monthly average is denoted L_{dnmr}. Noise levels are calculated the same way for both L_{dn} and L_{dnmr}. L_{dnmr} is interpreted by the same criteria as used for L_{dn}.

B.3 Noise Impact

B.3.1 Community Reaction

Studies of community annoyance to numerous types of environmental noise show that L_{dn} correlates well with impact. Schultz (1978) showed a consistent relationship between L_{dn} and annoyance. Shultz's original curve fit (Figure B 2) shows there is a remarkable consistency in results of attitudinal surveys, which relates the percentages of groups of people who express various degrees of annoyance when exposed to different L_{dn}.

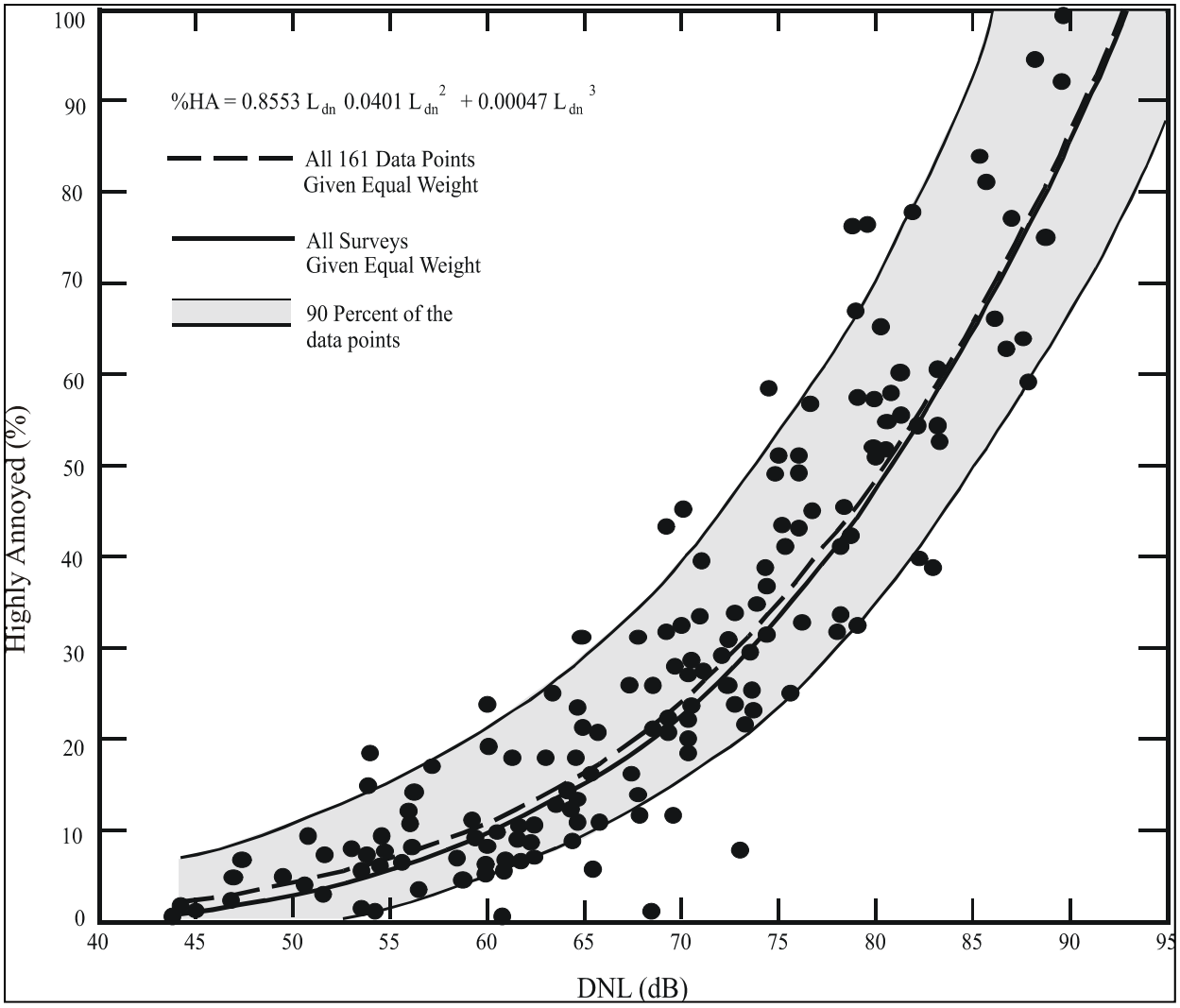
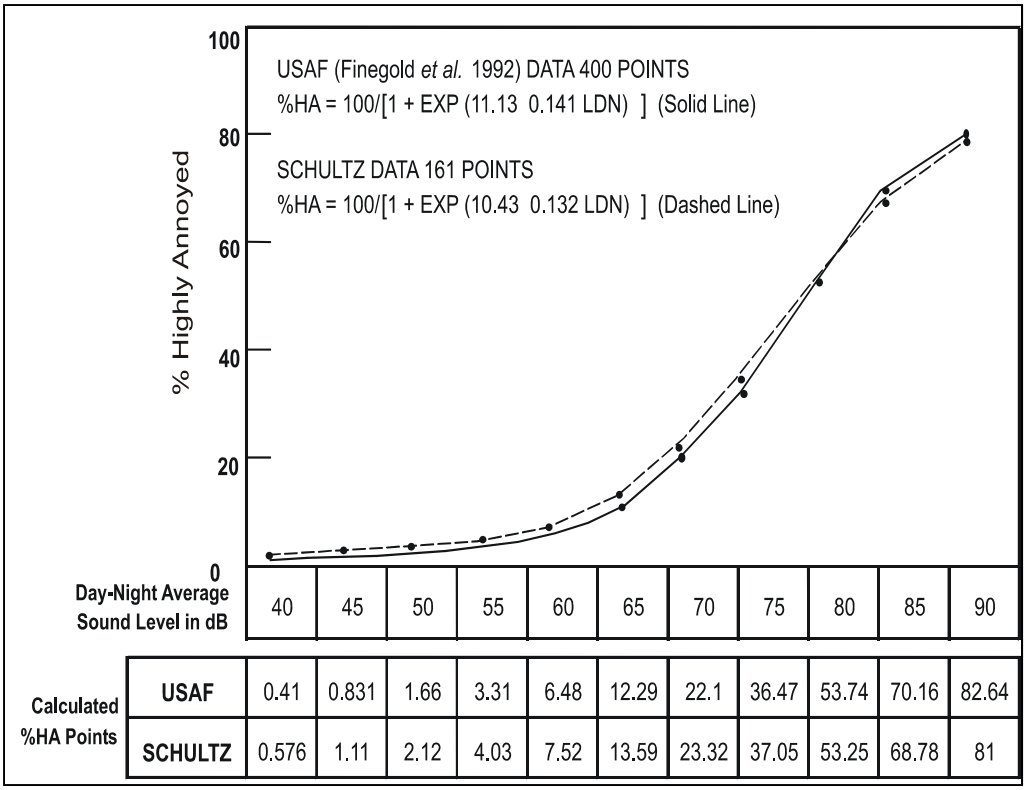


Figure B 2. Community Surveys of Noise Annoyance (Source: Schultz 1978)

A more recent study has reaffirmed this relationship (Fidell *et al.* 1991). Figure B 3 (FICON 1992) shows an updated form of the curve fit (Finegold *et al.* 1994) in comparison with the original. The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, on the order of 0.5 or less. This is not surprising, considering the varying personal factors that influence the manner in which individuals react to noise. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using L_{dn}.

As noted earlier for SEL, L_{dn} does not represent the sound level heard at any particular time, but rather represents the total sound exposure. L_{dn} accounts for the sound level of individual noise events, the duration of those events, and the number of events. Its use is endorsed by the scientific community (ANSI 1980, 1988; USEPA 1974; FICON 1980, 1992).



Day-Night Average Sound Level in dB		40	45	50	55	60	65	70	75	80	85	90
Calculated %HA Points	USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
	SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

Figure B 3. Response of Communities to Noise
Comparison of Original (Schultz 1978) and Current (Finegold *et al*. 1994) Curve Fits

While L_{dn} is the best metric for quantitatively assessing cumulative noise impact, it does not lend itself to intuitive interpretation by non-experts. Accordingly, it is common for environmental noise analyses to include other metrics for illustrative purposes. A general indication of the noise environment can be presented by noting the maximum sound levels that can occur and the number of times per day noise events would be loud enough to be heard. Use of other metrics as supplements to L_{dn} has been endorsed by federal agencies (FICON 1992).

The Schultz curve is generally applied to annual average L_{dn}. In Section B.2, L_{dnmr} was described and presented as being appropriate for quantifying noise in military airspace. In the current study, the Schultz curve is used with L_{dnmr} as the noise metric. L_{dnmr} is always equal to or greater than L_{dn}, so the impact of L_{dnmr} is generally higher than predicted if the onset rate and busiest-month adjustments were not taken into account.

There are several points of interest in the noise-annoyance relationship. The first is L_{dn} of 65 dB. This is a level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like aviation, which do cause noise. Areas exposed to L_{dn} above 65 dB are generally not considered suitable for residential use. The second is L_{dn} of 55 dB, which was identified by USEPA as a level"...requisite to protect the public health and welfare with an adequate margin of safety" (USEPA 1974) which is essentially a level below which adverse impact is not expected. The third is L_{dn} of 75 dB. This is the lowest level at which adverse health effects could be credible (USEPA 1974). The very high annoyance levels correlated with L_{dn} of 75 dB make such areas unsuitable for residential land use.

Sonic boom exposure is measured by C-weighting, with the corresponding cumulative metric being L_{cdn}. Correlation between L_{cdn} and annoyance has been established based on community reaction to impulsive sounds (CHABA 1981). Values of the C-weighted equivalent to the Schultz curve are different from those of the Schultz curve itself. Table B 1 shows the relationship between annoyance, L_{dn}, and L_{cdn}. Interpretation of L_{cdn} from impulsive noise is accomplished by using the L_{cdn} versus annoyance values in Table B 1. L_{cdn} can be interpreted in terms of an "equivalent annoyance" L_{dn}. For example, L_{cdn} of 52, 61, and 69 dB are equivalent to L_{dn} of 55, 65, and 75 dB, respectively. If both continuous and impulsive noise occurs in the same area, impacts are assessed separately for each.

Table B 1. Relationship Between Annoyance, L_{dn}, and L_{cdn}

C-Weighted Day–Night Average Sound Level (L_{cdn})	% Highly Annoyed	Day-Night Average Sound Levels (L_{dn})
48	2	50
52	4	55
57	8	60
61	14	65
65	23	70
69	35	75

B.4 Land Use Compatibility

The inherent variability between individuals makes it impossible to predict accurately how any individual would react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. The best noise exposure metric for this correlation is the L_{dn} or L_{dnmr} for military overflights. Impulsive noise can be assessed by relating L_{cdn} to an "equivalent annoyance" L_{dn}, as outlined in Section B.3.1.

In June 1980, an ad hoc Federal Interagency Committee on Urban Noise (FICON) published guidelines (FICON 1980) relating L_{dn} to compatible land uses. This committee was composed of representatives from DoD, Transportation, Housing and Urban Development, USEPA, and the Veterans Administration. Federal agencies have generally adopted these guidelines for their noise analyses.

Following the lead of the committee, DoD and FAA adopted the concept of land-use compatibility as the accepted measure of aircraft noise effect. The FAA included the committee's guidelines in the Federal Aviation Regulations (USDOT 1984). These guidelines are reprinted in Table B 2, along with the explanatory notes included in the regulation. Although these guidelines are not mandatory (note the footnote "*" in the table), they provide the best means for determining noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor L_{dn} values above 65 dB and the extent of land areas and populations exposed to L_{dn} of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions. In some cases, where noise change exceeds 3 dB, the 1992 FICON indicates the 60 dB L_{dn} may be a more appropriate incompatibility level for densely populated areas.

Table B 2. Land-Use Compatibility with Yearly Day-Night Average Sound Levels

Land Use	Yearly Day-Night Average Sound Level (L_{dn}) in Decibels (dB)					
	Below 65	65–70	70–75	75–80	80–85	Over 85
Residential						
Residential (other than mobile homes and transient lodgings)	Y	N(1)	N(1)	N	N	N
Mobile Home Parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and Nursing Homes	Y	25	30	N	N	N
Churches, Auditoria, and Concert Halls	Y	25	30	N	N	N
Government Services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, Business and Professional	Y	Y	25	30	N	N
Wholesale and Retail (Building Materials, Hardware, and Farm Equipment)	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail Trade (General)	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, General	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and Optical	Y	Y	25	30	N	N
Agriculture (except livestock) and Forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock Farming and Breeding	Y	Y(6)	Y(7)	N	N	N
Mining and Fishing, Resource Production and Extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor Sports Arenas and Spectator Sports	Y	Y(5)	Y(5)	N	N	N
Outdoor Music Shells, Amphitheaters	Y	N	N	N	N	N
Nature exhibits and Zoos	Y	Y	N	N	N	N
Amusements, Parks, Resorts, and Camps	Y	Y	Y	N	N	N
Golf Courses, Riding Stables, and Water Recreation	Y	Y	25	30	N	N

Notes:

*The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses.

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor NLR of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB; thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria would not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of the portions of these buildings where the public is received such as office areas, noise-sensitive areas, or where the normal noise level is low.

(3) Measures to achieve NLR 30 dB must be incorporated into the design and construction of the portions of these buildings where the public is received such as office areas, noise-sensitive areas, or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of the portions of these buildings where the public is received such as office areas, noise-sensitive areas, or where the normal noise level is low.

(5) Land-use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Key:

Y (YES) = Land Use and related structures compatible without restrictions.

N (No) = Land Use and related structures are not compatible and should be prohibited.

NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

25, 30, or 35 = Land Use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structures.

B.5 NOISE EFFECTS

The discussion in Section B.3 presents the global effect of noise on communities. The following sections describe particular noise effects.

B.5.1 Hearing Loss

There are situations where noise in and around airbases may exceed levels at which long-term noise-induced hearing loss is possible. The first of these situations results from exposure to occupational noise by individuals working in known high noise exposure locations such as jet engine maintenance facilities or aircraft maintenance hangars. Table B 2 provides details of the L_{dn} levels for various types of land use.

In this case, exposure of workers inside the base boundary area should be considered occupational, which is excluded from the DoD Noise Program by DoD Instruction 4715.13 and should be evaluated using the appropriate DoD component regulations for occupational noise exposure. The DoD, Air Force, and the National Institute of Occupational Safety and Health (NIOSH) have all established occupational risk criteria for noise exposure damage (or "standard") for hearing loss to not exceed 85 dB as an 8-hour time weighted average with a 3 dB exchange rate in a work environment. The exchange rate is an increment of decibels that requires the halving of exposure time or a decrement of decibels that requires the doubling of exposure time. For example, a 3 dB exchange rate requires that noise exposure time be halved for each 3 dB increase in noise level. Therefore, an individual would achieve the limit for risk criteria at 88 dB for a period of four hours and at 91 dB, for a period of two hours. The standard assumes "quiet" (where an individual remains in an environment with noise levels less than 72 dB) for the balance of the 24-hour period. Also, Air Force and Occupational Safety and Health Administration (OSHA) occupational standards prohibit any unprotected worker exposure to a continuous (i.e., of a duration greater than one second) noise exceeding a 115 dB sound level. OSHA established this additional standard to reduce the risk of workers developing noise-induced hearing loss.

The second situation where individuals may be exposed to high noise levels is when noise contours resulting from flight operations in and around the installation reach or exceed 80 dB L_{dn} both on- and off-base. To access the potential impacts of this situation, the DoD published a policy for assessing hearing loss risk (UDATL 2009). The policy defines the conditions under which assessments are required, references the methodology from a 1982 USEPA report, and describes how the assessments are to be calculated (USEPA 1982). The policy reads as follows, "Current and future high performance aircraft create a noise environment in which the current impact analysis based primarily on annoyance may be insufficient to capture the full range of impacts on humans. As part of the noise analysis in all future environmental impact statements, DoD components would use the 80 Day-Night A-Weighted (L_{dn}) noise contour to identify populations at the most risk of potential hearing loss. DoD components would use as part of the analysis, as appropriate, a calculation of the Potential Hearing Loss (PHL) of the at risk population. The PHL (sometimes referred to as Population Hearing Loss) methodology is defined in USEPA Report No. 550/9-82-105, *Guidelines for Noise Impact Analysis*."

The USEPA *Guidelines for Noise Impact Analysis* (hereafter referred to as "USEPA Guidelines") specifically addresses the criteria and procedures for assessing the noise-induced hearing loss in

terms of the Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in hearing level, or threshold, caused by exposure to noise (USEPA 1982). Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kilohertz (kHz) that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10 to 90 percentiles of the exposed population) is termed the Average NIPTS. The Average NIPTS attributable to noise exposure for ranges of noise level in terms of L_{dn} is given in Table B 3.

Table B 3. Average Noise-Induced Permanent Threshold Shift (NIPTS) and 10th Percentile NIPTS as a Function of L_{dn}*

Day-night Average Sound Level (L_{dn})	Average NIPTS in decibels (dB)**	10th Percentile NIPTS in decibels (dB)**
80-81	3.0	7.0
81-82	3.5	8.0
82-83	4.0	9.0
83-84	4.5	10.0
84-85	5.5	11.0
85-86	6.0	12.0
86-87	7.0	13.5
87-88	7.5	15.0
88-89	8.5	16.5
89-90	9.5	18.0

Notes:
*Relationships between L_{dn} and NIPTS were derived from CHABA 1977.
**NIPTS values rounded to the nearest 0.5 dB.

For a noise exposure within the 80-81 L_{dn} contour, the expected lifetime average value of NIPTS (hearing loss) is 3.0 dB. The Average NIPTS is estimated as an average over all people included in the at risk population. The actual value of NIPTS for any given person would depend on the person's physical sensitivity to noise. Some people would experience more loss of hearing than other people would. The USEPA Guidelines provide information on this variation in sensitivity in the form of the NIPTS exceeded by 10 percent of the population, which is included in Table B 3 in the "10th Percentile NIPTS" column. As in the example above, for individuals within the 80-81 L_{dn} contour band, the most sensitive of the population, would be expected to show no more degradation to their hearing than experiencing a 7.0 dB Average NIPTS hearing loss. And while the DoD policy requires that hearing loss risk is estimated for the population exposed to 80 dB L_{dn} or greater, this does not preclude populations outside the 80 L_{dn} contour (i.e. at lower exposure levels) from being at some degree of risk of hearing loss.

The actual noise exposure for any person living in the at-risk area is determined by the time that person is outdoors and directly exposed to the noise. Many of the people living within the applicable L_{dn} contour would not be present during the daytime hours; they may be at work, at school, or involved in other activities outside the at-risk area. Many would be inside their homes and thereby exposed to lower noise levels and benefitting from the noise attenuation provided by the house structure. The actual activity profile is usually impossible to generalize. For the purposes of this analysis, it was assumed that residents are fully exposed to the L_{dn} level of noise appropriate for their residence location and the Average NIPTS taken from Table B 3.

The quantity to be reported is the number of people living within each 1 dB contour band inside the 80 dB L_{dn} contour who are at risk for hearing loss given by the Average NIPTS for that band.

The average nature of Average NIPTS means that it underestimates the magnitude of the potential hearing loss for the population most sensitive to noise. Therefore, in the interest of disclosure, the information to be reported includes both the Average NIPTS and the 10th percentile NIPTS (Table B 3) for each 1 dB contour band inside the 80 L_{dn} contour.

According to the USEPA documents titled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, and Public Health and Welfare Criteria for Noise*, changes in hearing levels of less than 5 dB are generally not considered noticeable or significant. There is no known evidence that a NIPTS of less than 5 dB is perceptible or has any practical significance for the individual. Furthermore, the variability in audiometric testing is generally assumed to be ± 5 dB. The preponderance of available information on hearing loss risk is collected from workplaces where there is continuous exposure throughout the day for many years. Clearly, this data is applicable to the adult working population. According to a report by Ludlow and Sixsmith, there were no significant differences in audiometric test results between military personnel who, as children, lived in or near stations where jet operations were based and a similar group who had no such exposure as children (Ludlow and Sixsmith 1999). Hence, for the purposes of PHL analysis, it can be assumed that the limited data on hearing loss is applicable to the general population including children, and provides a conservative estimate of hearing loss.

B.5.2 Nonauditory Health Effects

Nonauditory health effects of long-term noise exposure, where noise may act as a risk factor, have not been found to occur at levels below those protective against noise-induced hearing loss, described above. Most studies attempting to clarify such health effects have found that noise exposure levels established for hearing protection would also protect against any potential nonauditory health effects, at least in workplace conditions. The best scientific summary of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss that was held on January 22–24, 1990 in Washington, DC. This paper states "The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an eight-hour day)" (von Gierke 1990; parenthetical wording added for clarification). At the International Congress (1988) on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss; and even above these criteria, results regarding such health effects were ambiguous.

It can be concluded that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem but also any potential nonauditory health effects in the work place. Although these findings were directed specifically at noise effects in the work place, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous at best, and often contradictory. Yet, even those studies that purport to find such health effects use time average noise levels of 75 dB and higher for their research.

For example, in an often-quoted paper, two University of California at Los Angeles researchers found a relationship between aircraft noise levels under the approach path to Los Angeles International Airport and increased mortality rates among the exposed residents by using an average level of noise exposure that was greater than 75 dB for the "noise-exposed" population (Meecham and Shaw 1979). Nevertheless, three other University of California at Los Angeles professors analyzed those same data and found no relationship between noise exposure and mortality rates (Frerichs *et al*. 1980).

As a second example, two other University of California at Los Angeles researchers used this same population near Los Angeles International Airport to show a higher rate of birth defects during the period of 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the United States Centers for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport for 1970 to 1972 and found no relationship in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds 1979).

A recent review of health effects, prepared by a Committee of the Health Council of The Netherlands analyzed currently available published information on this topic (CHCN 1996). The committee concluded that the threshold for possible long-term health effects was a 16-hour (6:00 AM to 10:00 PM) L_{eq} of 70 dB. Projecting this to 24 hours and applying the 10 dB nighttime penalty used with L_{dn}, this corresponds to L_{dn} of about 75 dB. The study also affirmed the risk threshold for hearing loss, as discussed earlier.

In summary, there is no scientific basis to claim that potential health effects exist for aircraft time-average sound levels below 75 dB.

B.5.3 Annoyance

The primary effect of aircraft noise on exposed communities is one of annoyance. Noise annoyance is defined by the USEPA as any negative subjective reaction on the part of an individual or group (USEPA 1974). As noted in the discussion of L_{dn} above, community annoyance is best measured by that metric.

Since the USEPA Levels Document (USEPA 1974) identified L_{dn} of 55 dB as ". . . requisite to protect public health and welfare with an adequate margin of safety", it is commonly assumed that 55 dB should be adopted as a criterion for community noise analysis. From a noise exposure perspective, that would be an ideal selection. However, financial and technical resources are generally not available to achieve that goal. Most agencies have identified L_{dn} of 65 dB as a criterion, which protects those most impacted by noise, and which can often be achieved on a practical basis (FICON 1992). This corresponds to about 13 percent of the exposed population being highly annoyed.

Although L_{dn} of 65 dB is widely used as a benchmark for significant noise impact, and is often an acceptable compromise, it is not a statutory limit, and it is appropriate to consider other thresholds in particular cases.

In this Draft EA, no specific threshold is used. The noise in the affected environment is evaluated based on the information presented in this appendix and in the body of the Draft EA.

Community annoyance from sonic booms is based on L_{cdn}, as discussed in Section B.3. These effects are implicitly included in the "equivalent annoyance" L_{cdn} values in Table B 1, since those were developed from actual community noise impact.

B.5.4 Speech Interference

Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. The disruption of routine activities in the home, such as radio or television listening, telephone use, or family conversation, gives rise to frustration and irritation. The quality of speech communication is also important in classrooms, offices, and industrial settings and can cause fatigue and vocal strain in those who attempt to communicate over the noise. Research has shown that, for speakers talking with a casual vocal effort, 95% intelligibility would be achieved when indoor L_{max} values did not exceed 50 dB.

B.5.5 Sleep Interference

Sleep interference is another source of annoyance associated with aircraft noise. This is especially true because of the intermittent nature and content of aircraft noise, which is more disturbing than continuous noise of equal energy and neutral meaning.

Sleep interference may be measured in either of two ways. "Arousal" represents actual awakening from sleep, while a change in "sleep stage" represents a shift from one of four sleep stages to another stage of lighter sleep without actual awakening. In general, arousal requires a somewhat higher noise level than does a change in sleep stage.

An analysis sponsored by the Air Force summarized 21 published studies concerning the effects of noise on sleep (Pearsons *et al*. 1989). The analysis concluded that a lack of reliable in-home studies, combined with large differences among the results from the various laboratory studies, did not permit development of an acceptably accurate assessment procedure. The noise events used in the laboratory studies and in contrived in-home studies were presented at much higher rates of occurrence than would normally be experienced. None of the laboratory studies was sufficiently long in duration to determine any effects of habituation, such as that which would occur under normal community conditions. A recent extensive study of sleep interference in people's own homes (Ollerhead 1992) showed very little disturbance from aircraft noise.

There is some controversy associated with the recent studies, so a conservative approach should be taken in judging sleep interference. Based on older data, the USEPA identified an indoor L_{dn} of 45 dB as necessary to protect against sleep interference (USEPA 1974). Assuming a very conservative structural noise insulation of 20 dB for typical dwelling units, this corresponds to an outdoor L_{dn} of 65 dB as minimizing sleep interference.

A 1984 publication reviewed the probability of arousal or behavioral awakening in terms of SEL (Kryter 1984). Figure B 4, extracted from Figure 10.37 of Kryter (1984), indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of those exposed. These results do not include any habituation over time by sleeping subjects. Nevertheless, this provides a reasonable guideline for assessing sleep interference and corresponds to similar guidance for speech interference, as noted above.

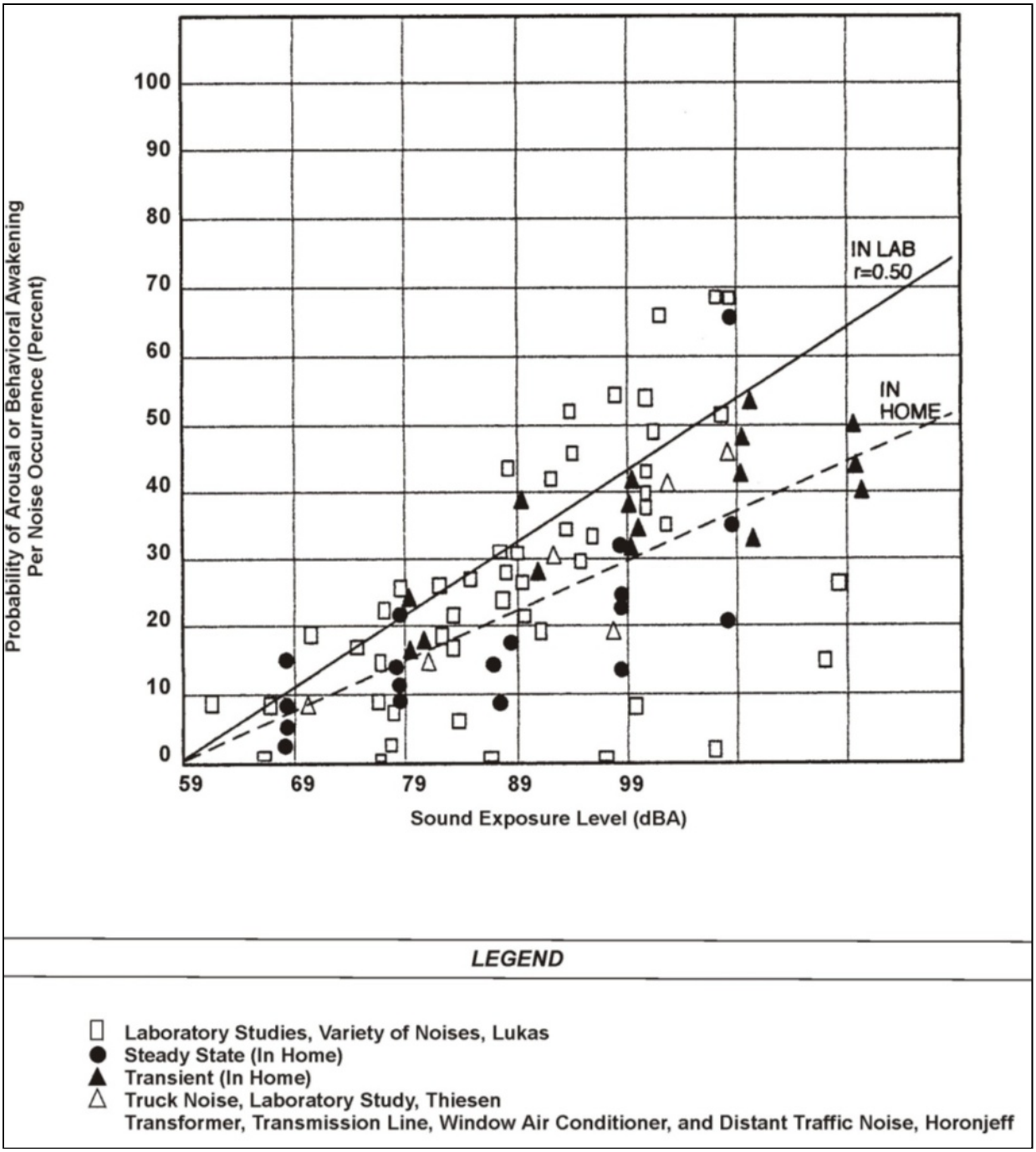


Figure B 4. Probability of Arousal or Behavioral Awakening in Terms of Sound Exposure Level

B.5.6 Noise Effects on Domestic Animals and Wildlife

Animal species differ greatly in their responses to noise. Each species has adapted, physically and behaviorally, to fill its ecological role in nature, and its hearing ability usually reflects that role. Animals rely on their hearing to avoid predators, obtain food, and communicate with and attract other members of their species. Aircraft noise may mask or interfere with these functions. Secondary effects may include nonauditory effects similar to those exhibited by humans: stress, hypertension, and other nervous disorders. Tertiary effects may include interference with mating and resultant population declines.

B.5.7 Noise Effects on Structures

Subsonic Aircraft Noise - Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at sound levels above 130 dB, there is the possibility of the excitation of structural component resonance. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (NRC/NAS 1977).

A study directed specifically at low-altitude, high-speed aircraft showed that there is little probability of structural damage from such operations (Sutherland 1989). One finding in that study is that sound levels at damaging frequencies (e.g., 30 Hz for window breakage or 15 to 25 Hz for whole-house response) are rarely above 130 dB.

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or "rattle", of objects within the dwelling, such as hanging pictures, dishes, plaques, and bric-a-brac. Windowpanes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. In general, such noise-induced vibrations occur at sound levels above those considered normally incompatible with residential land use. Thus, assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

Sonic Booms - Sonic booms are commonly associated with structural damage. Most damage claims are for brittle objects, such as glass and plaster. Table B 4 summarizes the threshold of damage that might be expected at various overpressures. There is a large degree of variability in damage experience, and much damage depends on the pre-existing condition of a structure. Breakage data for glass, for example, spans a range of two to three orders of magnitude at a given overpressure. At 1 psf, the probability of a window breaking would range from one in a billion (Sutherland 1990) to one in a million (Hershey and Higgins 1976). These damage rates are associated with a combination of boom load and glass condition. At 10 psf, the probability of breakage is from one in one hundred and one in one thousand.

Table B 4. Possible Damage to Structures from Sonic Booms

Sonic Boom Overpressure Nominal (psf)	Item Affected	Type of Damage
0.5 - 2	Plaster	Fine cracks; extension of existing cracks with more in ceilings, over doorframes, and between some plasterboard.
	Glass	Rarely shattered, either partial or extension of existing cracks.
	Roof	Slippage of existing loose tiles/slates and sometimes new cracking of old slates at nail hole.
	Damage to outside walls	Existing cracks in stucco extended.
	Bric-a-brac	Those carefully balanced or on edges can fall; fine glass, such as large goblets, can fall and break.
	Other	Dust falls in chimneys.
2 - 4	Glass, plaster, roofs, ceilings	For elements nominally in good condition, failures show that would have been difficult to forecast in terms of their existing localized condition.
4 - 10	Glass	Regular failures within a population of well-installed glass; industrial as well as domestic greenhouses.
	Plaster	Partial ceiling collapse of good plaster; complete collapse of very new, incompletely cured, or very old plaster.
	Roofs	High probability rate of failure in slurry wash in nominally good state; some chance of failures in tiles on modern roofs; light roofs (bungalow) or large area can move bodily.
	Walls (out)	Old, free standing, in fairly good condition can collapse.
	Walls (in)	Internal ("party") walls known to move at 10 psf.
Greater than 10	Glass	Some good window glass would fail when exposed to regular sonic booms from the same direction. Glass with existing faults could shatter and fly. Large window frames move.
	Plaster	Most plaster affected.
	Ceilings	Plasterboards displaced by nail popping.
	Roofs	Most slate/slurry roofs affected, some badly; large roofs having good tile can be affected; some roofs bodily displaced causing gale-end and wall plate cracks; domestic chimneys dislodged if not in good condition.
	Walls	Internal party walls can move even if carrying fittings such as hand basins or taps; secondary damage due to water leakage.
	Bric-a-brac	Some nominally secure items can fall; e.g., large pictures, especially if fixed to party walls.

Key:
psf = pounds per square foot
Source: Haber and Nakaki 1989

Laboratory tests of glass (White 1972) have shown that properly installed window glass would not break at overpressures below 10 psf, even when subjected to repeated booms, but in the real world, glass is not in pristine condition.

Damage to plaster occurs at similar ranges to glass damage. Plaster has a compounding issue in that it would often crack due to shrinkage while curing or from stresses as a structure settles, even in the absence of outside loads. Sonic boom damage to plaster often occurs when internal stresses are high from these factors.

Some degree of damage to glass and plaster should thus be expected whenever there are sonic booms, but usually at the low rates noted above. In general, structural damage from sonic booms should be expected only for overpressures above 10 psf.

B.5.8 Noise Effects on Terrain

Subsonic Aircraft Noise - Members of the public often believe that noise from low-flying aircraft can cause avalanches or landslides by disturbing fragile soil or snow structures in mountainous areas. There are no known instances of such effects, and it is considered improbable that such effects would result from routine, subsonic aircraft operations**.**

Sonic Booms - In contrast to subsonic noise, sonic booms are considered a potential trigger for snow avalanches. Avalanches are highly dependent on the physical status of the snow, and do occur spontaneously. They can be triggered by minor disturbances, and there are documented accounts of sonic booms triggering avalanches. Switzerland routinely restricts supersonic flight during avalanche season.

Landslides are not an issue for sonic booms. There was one anecdotal report of a minor landslide from a sonic boom generated by the Space Shuttle during landing, but there is no credible mechanism or consistent pattern of reports.

B.5.9 Noise Effects on Historical and Archaeological Sites

Due to the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures. Again, there are few scientific studies of such effects to provide guidance for their assessment.

One study involved the measurements of sound levels and structural vibration levels in a superbly restored plantation house, originally built in 1795, and now situated approximately 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. These measurements were made in connection with the proposed scheduled operation of the supersonic Concorde airplane at Dulles (Wesler 1977). There was special concern for the building's windows, since roughly half of the 324 windowpanes were original. No instances of structural damage were found.

Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning within the building itself.

As noted above for the noise effects of noise-induced vibrations on normal structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

B.6 Noise Modeling

B.6.1 Subsonic Aircraft Noise

An aircraft in subsonic flight generally emits noise from two sources: the engines and flow noise around the airframe. Noise generation mechanisms are complex and, in practical models, the noise sources must be based on measured data. The Air Force has developed a series of computer models and aircraft noise databases for this purpose. The models include NOISEMAP (Moulton 1992) for noise around airbases, ROUTEMAP (Lucas and Plotkin 1988) for noise associated with low-level training routes, and MR_NMAP (Lucas and Calamia 1996)

for use in MOAs and ranges. These models use the NOISEFILE database developed by the Air Force. NOISEFILE data includes SEL and L_{Amax} as a function of speed and power setting for aircraft in straight flight.

Noise from an individual aircraft is a time-varying continuous sound. It is first audible as the aircraft approaches, increases to a maximum when the aircraft is near its closest point, and then diminishes as it departs. The noise depends on the speed and power setting of the aircraft and its trajectory. The models noted above divide the trajectory into segments whose noise can be computed from the data in NOISEFILE. The contributions from these segments are summed.

MR_NMAP was used to compute noise levels in the airspace. The primary noise metric computed by MR_NMAP was L_{dnmr}, which was averaged over the airspace. Supporting routines from NOISEMAP were used to calculate SEL and L_{Amax} for various flight altitudes and lateral offsets from a ground receiver position.

B.6.2 Sonic Booms

When an aircraft moves through the air, it pushes the air out of its way. At subsonic speeds, the displaced air forms a pressure wave that disperses rapidly. At supersonic speeds, the aircraft is moving too quickly for the wave to disperse, so it remains as a coherent wave. This wave is a sonic boom. When heard at the ground, a sonic boom consists of two shock waves (one associated with the forward part of the aircraft, the other with the rear part) of approximately equal strength and (for fighter aircraft) separated by 100 to 200 milliseconds. When plotted, the pair of shock waves and the expanding flow between the shockwaves has the appearance of a capital letter “N”, so a sonic boom pressure wave is usually called an “N-wave”. An N-wave has a characteristic "bang-bang" sound that can be startling. Figure B 5 shows the generation and evolution of a sonic boom N-wave under the aircraft. Figure B 6 shows the sonic boom pattern for an aircraft in steady supersonic flight. The boom forms a cone that is said to sweep out a “carpet” under the flight track.

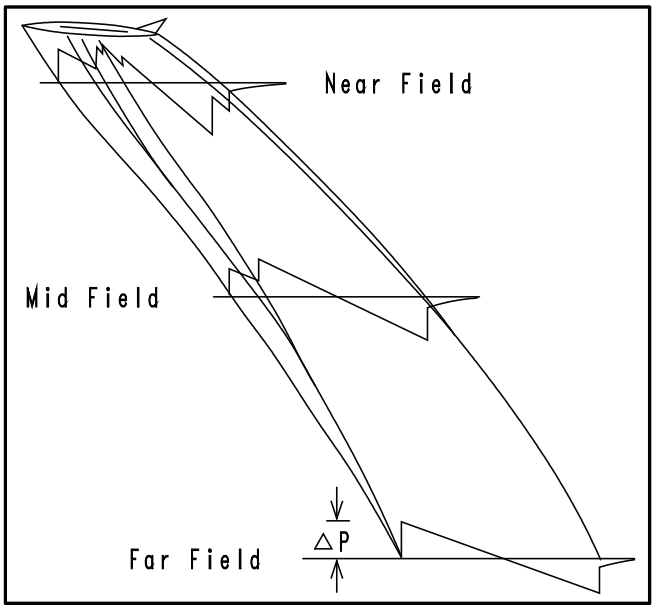


Figure B 5. Sonic Boom Generation and Evolution to N-wave

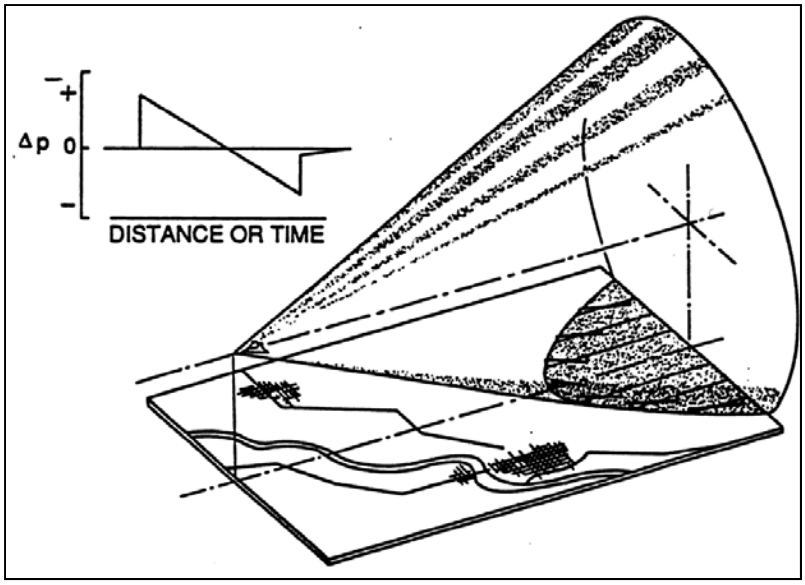


Figure B 6. Sonic Boom Carpet in Steady Flight

The complete ground pattern of a sonic boom depends on the size, shape, speed, and trajectory of the aircraft. Even for a nominally steady mission, the aircraft must accelerate to supersonic speed at the start, decelerate back to subsonic speed at the end, and usually change altitude. Figure B 7 illustrates the complexity of a nominal full mission.

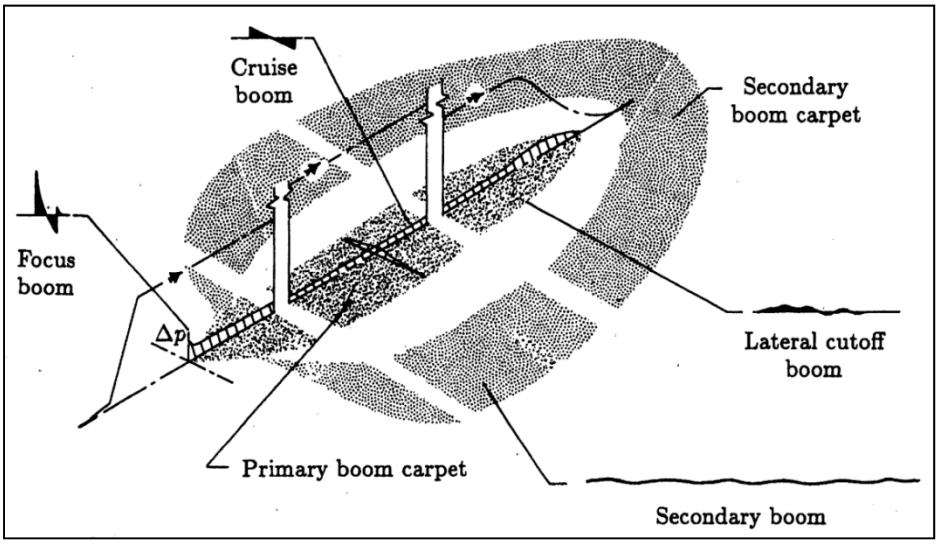


Figure B 7. Complex Sonic Boom Pattern for Full Mission

The Air Force's PCBoom4 computer program (Plotkin and Grandi 2002) can be used to compute the complete sonic boom footprint for a given single event, accounting for details of a particular maneuver.

Supersonic operations for the Proposed Action and alternatives are, however, associated with air combat training, which cannot be described in the deterministic manner that PCBoom4 requires. Supersonic events occur as aircraft approach an engagement, break at the end, and

maneuver for advantage during the engagement. Long time cumulative sonic boom exposure, L_{cdn}, is meaningful for this kind of environment.

Long-term sonic boom measurement projects have been conducted in four supersonic air combat training airspaces: White Sands, New Mexico (Plotkin *et al.* 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin *et al.* 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton *et al.* 1993); and the western portion of the Goldwater Range (Page *et al.* 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data and supported development of the 1992 BOOMAP model (Plotkin *et al.* 1992). The current version of BOOMAP (Frampton *et al.* 1993; Plotkin 1996) incorporates results from all four studies. Since BOOMAP is directly based on long-term measurements, it implicitly accounts for such variables as maneuvers, statistical variations in operations, atmosphere effects, and other factors.

Figure B 8 shows a sample of supersonic flight tracks measured in the air combat training airspace at White Sands (Plotkin *et al.* 1989). The tracks fall into an elliptical pattern aligned with preferred engagement directions in the airspace. Figure B 9 shows the L_{cdn} contours that were fit to six months of measured booms in that airspace.

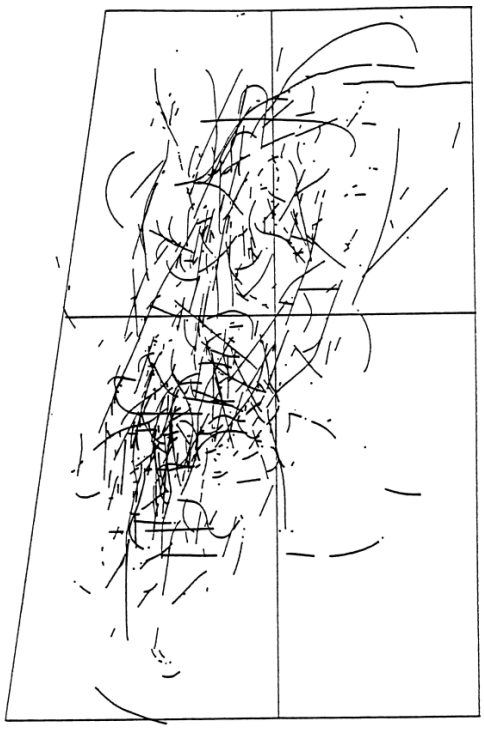


Figure B 8. Supersonic Flight Tracks in Supersonic Air Combat Training Airspace

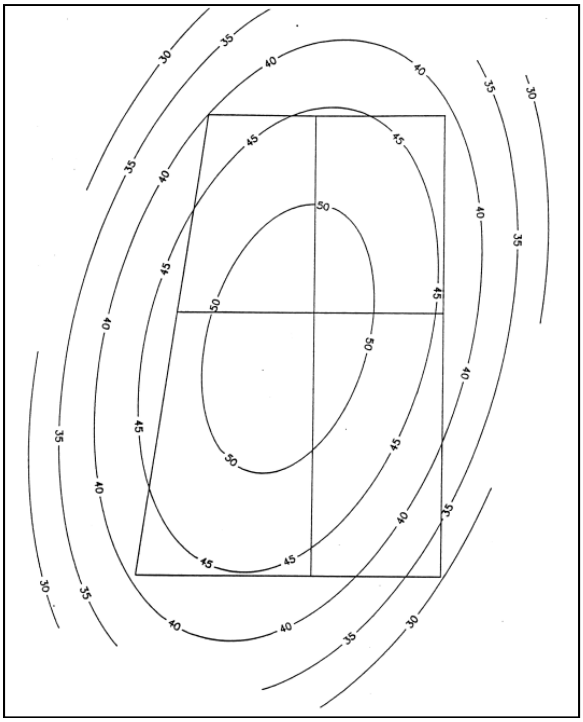


Figure B 9. Elliptical L_{cdn} Contours in Supersonic Air Combat Training Airspace

The subsequent measurement programs refined the fit, and demonstrated that the elliptical maneuver area is related to the size and shape of the airspace (Frampton *et al*. 1993). BOOMAP quantifies the size and shape of L_{cdn} contours, and numbers of booms per day, in air combat training airspaces. That model was used for prediction of cumulative sonic boom exposure in the study area.

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Appendix C Federal Agency Coastal Zone Management Act Consistency Determination

C.1 Introduction

This document provides the state of Florida with the U.S. Air Force's Consistency Determination under the Coastal Zone Management Act (CZMA), Section 307 and 15 Code of Federal Regulations (CFR) Part 930 sub-part C. The information in this Consistency Determination is provided pursuant to 15 CFR Section 930.39 and Section 307 of the CZMA, 16 USC § 1456, as amended, and its implementing regulations at 15 CFR Part 930.

This federal Consistency Determination addresses the Proposed Action and alternatives associated with the F-22 operational squadron and T-38 detachment beddown at Tyndall Air Force Base (AFB), FL.

C.2 Proposed Federal Agency Action

The Proposed Action would result in the addition of 21 F-22 primary aircraft and up to 20 T-38 primary aircraft. This action is intended to consolidate the F-22 fleet at strategic locations to meet mission responsibilities for worldwide deployment. The T-38 would provide dissimilar aircraft combat training and provide a low-cost aggressor force for F-22 training. The Proposed Action would consist of renovation and construction activities along the Tyndall AFB flightline and near the Munitions Storage Area (MSA); flight training operations near Tyndall AFB as well as in primary training airspace currently used by Tyndall AFB-assigned squadrons. Alternative 1 reduces the number of T-38s to 10 primary aircraft. For a detailed summary of actions associated with the Proposed Action and Alternative 1, refer to Chapter 2 of the Draft Environmental Assessment (EA).

C.3 Federal Review

Statutes addressed as part of the Florida Coastal Zone Management Program consistency review and considered in the analysis of the Proposed Action and Alternative 1 are discussed in Table C 1. Based upon the information, data, and analysis as contained in the EA, Tyndall AFB finds that the Proposed Action and Alternative 1 are consistent (to the maximum extent practicable) with the enforceable policies of the Florida Coastal Management Program.

Pursuant to 15 CFR § 930.41, the Florida State Clearinghouse has 60 days from receipt of this document in which to concur with, or object to, this Consistency Determination, or to request an extension, in writing, under 15 CFR § 930.41(b). A letter dated July 21, 2011 from the Florida Department of Environmental Protection determined the proposed activities are consistent with the Florida Coastal Management Program. Final concurrence would be determined during the environmental permitting process in accordance with Section 373.428, *Florida Statutes*. A copy of this letter is provided in Appendix A.

Table C 1.Florida Coastal Zone Management Program Consistency Review

Statute	Scope	Consistency
Chapter 161 *Beach and Shore Preservation*	Authorizes the Bureau of Beaches and Coastal Systems within the Department of Environmental Protection (DEP) to regulate construction on or seaward of the states' beaches.	The Proposed Action and alternatives would not affect beach and shore management specifically as it pertains to: the Coastal Construction Permit Program, the Coastal Construction Control Line (CCCL) Permit Program, and the Coastal Zone Protection Program. Construction and renovation activities would occur inland of the beach and shore.
Chapter 163, Part II *Growth Policy; County and Municipal Planning; Land Development Regulation*	Requires local governments prepare, adopt, and implement comprehensive plans that encourage the most appropriate use of land and natural resources in a manner consistent with the public interest.	The Proposed Action and alternatives occur on federal property and conform to local government's comprehensive development plans.
Chapter 186 *State and Regional Planning*	Details state-level planning requirements and requires development of special statewide plans that govern water use, land development, and transportation.	State, federal, and regional agencies have been provided the opportunity to review the document. The Proposed Action and alternatives occur on federal property. It conforms to the State Comprehensive Plan and associated translational plans including the State Land Development Plan, Florida Water Plan, Florida Transportation Plan, and strategic regional policy plans.
Chapter 252 *Emergency Management*	Provides for planning and implementation of the state's response to, efforts to recover from, and the mitigation of natural and manmade disasters.	The Proposed Action and alternatives would not increase the state's vulnerability to natural disasters. Emergency response and evacuation procedures would not be impacted by the Proposed Action or alternatives.
Chapter 253 *State Lands*	Addresses the state's administration of public lands and property of this state and provides direction regarding the acquisition, disposal, and management of all state lands.	The Proposed Action and alternatives would occur on federal property and would not affect state or public lands.
Chapter 258 *State Parks and Preserves* Chapter 259 *Land Acquisition for Conservation or Recreation* Chapter 260 *Recreational Trails System* Chapter 375 *Multipurpose Outdoor Recreation; Land Acquisition, Management, and Conservation*	Addresses administration and management of state parks and preserves (Chapter 258). Authorizes acquisition of environmentally endangered lands and outdoor recreation lands (Chapter 259). Develops comprehensive multipurpose outdoor recreation plan to document recreational supply and demand, describes current recreational opportunities, estimates need for additional recreational opportunities, and proposes means to meet the identified needs (Chapter 375).	State parks, recreational areas, and aquatic preserves would not be affected by the Proposed Action or Alternative 1. The effects of the Proposed Action or Alternative 1 would be minimal to state parks and recreational areas. Tourism and outdoor recreation would not be affected. Opportunities for recreation on state lands would not be decreased.
Chapter 267 *Historical Resources*	Addresses management and preservation of the state's archaeological and historical resources.	Potential impacts to cultural resources are discussed in Chapter 4, Section 4.7 of this EA, and no impact to cultural or historic resources is anticipated.
Chapter 288 *Commercial Development and Capital Improvements*	Provides the framework for promoting and developing the general business, trade, and tourism components of the state economy.	The Proposed Action and alternatives occur on federal property. The Proposed Action and alternatives are not anticipated to have any effect on future business opportunities on state lands or the promotion of tourism in the region.

Statute	Scope	Consistency
Chapter 334 *Transportation Administration* Chapter 339 *Transportation Finance and Planning*	Addresses the state's policy concerning transportation administration (Chapter 334). Addresses the finance and planning needs of the state's transportation system (Chapter 339)	Implementation of the Proposed Action or Alternative 1 would not result in impacts to the use of transportation resources in the region. Transportation is addressed in Chapter 4, Section 4.8 of this EA.
Chapter 370 *Saltwater Fisheries*	Addresses management and protection of the state's saltwater fisheries.	Saltwater fisheries would not be affected.
Chapter 372 *Wildlife*	Addresses the management of the wildlife resources of the state	Potential impacts to wildlife are evaluated in Chapter 4, Section 4.6.1. The Proposed Action and alternatives would not significantly affect threatened and/or endangered species. Impacts to threatened and endangered species are not anticipated with this action.
Chapter 373 *Water Resources*	Addresses the state's policy concerning water resources.	The Tyndall AFB Water Resources Section would coordinate all applicable permits in accordance with the Florida Administrative Code (FAC). The Proposed Action and Alternatives 1 would increase the potential for impacts to water resources due to an increased rate and volume of storm water runoff resulting from an overall increase in impervious surface area. To limit the effects on water resources, standard construction practices would be applied to control erosion and storm water runoff. Applicable permitting requirements would be satisfied in accordance with FAC 62-25 and the National Pollutant Discharge Elimination System (NPDES) (under the purview of the Clean Water Act). Tyndall AFB would submit a Notice of Intent to use the generic permit for storm water discharge under the NPDES program prior to project initiation. The Proposed Action and Alternatives 1 would also require coverage under the generic permit for storm water discharge from construction activities that disturb one or more acres of land (FAC 62-621). Wetlands in the construction area have not been delineated yet in accordance with the United States Army Corps of Engineers (USACE) 1987 Wetlands Delineation Manual. Prior to any ground disturbing activities, a jurisdictional delineation from the USACE would be performed for sited construction projects. If jurisdictional wetlands were identified in any of the construction areas, a Clean Water Act Section 404 permit through USACE for discharges to waters of the United States would be required. Additionally, as required by Executive Order 11990 (Protection of Wetlands), the appropriate designee of the Secretary of the Air Force would publish a Finding of No Practicable Alternative (FONPA) prior to implementing any activities impacting wetlands.
Chapter 376 *Pollutant Discharge Prevention and Removal*	Regulates transfer, storage, and transportation of pollutants and cleanup of pollutant discharges.	Construction activities disturbing an area larger than one acre would require a NPDES General Permit. A Storm Water Pollution Prevention Plan (SWPPP) would also be required under the NPDES permit before beginning construction activities. The Proposed Action and alternatives does not affect the transfer, storage, or transportation of pollutants.
Chapter 377 *Energy Resources*	Addresses regulation, planning, and development of the state's oil and gas resources.	The Proposed Action or Alternative 1 would not affect energy resource production including oil and gas and/or the transportation of oil and gas.

Statute	Scope	Consistency
Chapter 380 *Land and Water Management*	Establishes land and water management policies to guide and coordinate location decisions relating to growth and development.	The Proposed Action and alternatives would not affect development of state lands with regional impacts. The Proposed Action and alternatives would not include changes to coastal infrastructure such as capacity increases of existing coastal infrastructure, or use of state funds for infrastructure planning, designing, or construction.
Chapter 381 *Public Health, General Provisions*	Establishes public policy concerning the state's public health system.	The Proposed Action and alternatives would not affect the state's policy concerning the public health system.
Chapter 388 *Mosquito Control*	Addresses the state's mosquito control efforts.	The Proposed Action and alternatives would not affect mosquito control efforts.
Chapter 403 *Environmental Control*	Establishes the state's public policy concerning environmental control.	Tyndall AFB would coordinate all applicable permits in accordance with the Florida Administrative Code. Prior to construction, standard construction practices as described in Section 4.5 and 4.6 would be implemented to minimize impacts to surface waters, storm water, wetlands, and other environmental resources. Therefore, the Proposed Action and Alternative 1 would be consistent with Florida's statutes and regulations regarding water quality, air quality, pollution control, solid waste management, or other environmental control efforts.
Chapter 582 *Soil and Water Conservation*	Provides for the control and prevention of soil erosion.	Major impacts to soils and sediments are not anticipated. Some soil disturbance would occur from construction, but transportation of soil off-site would be controlled through standard construction practices such as preserving vegetation for as long as possible and stabilizing disturbed areas. Therefore, the Proposed Action and Alternative 1 would not affect soil and water conservation efforts.

Key:

AFB = Air Force Base
CCCL = Coastal Construction Control Line
DEP = Department of Environmental Protection
EA = Environmental Assessment
EO = Executive order
FAC = Florida Administrative Code
FONPA = Finding of No Practicable Alternative
NPDES = National Pollutant Discharge Elimination System
SWPPP = Storm Water Pollution Prevention Plan
USACE = United States Army Corps of Engineers

Appendix D Ecological Associations and Plant and Animal Species Typically Found under Tyndall MOAs

D.1 Sandhill Ecological Association

This association is characterized by rolling sandhill ridges dissected by streams and includes pockets of moist habitat ranging from steeply sloped flat and xeric (dry) to mesic (moist). Soils consisting of loamy sands, sandy loams, clay loams, and muck soils are found in lower lying areas.

Within the Sandhill Ecological Association are ten upland plant communities including sandhills, scrub, xeric hammock, upland pine forest, upland hardwood and mixed forests, bluff, seepage streams, alluvial streams, slope forest, depression marshes, and sandhill upland lake communities. Low shrubs include saw palmetto, persimmon, dwarf huckleberry, gopher apple, and various oaks, while dominant trees include stands of longleaf pine and sand pine, along with oaks and magnolia. The understory is comprised of various grasses, herbs, lichens, and several rare plants including sunflower, milkweed, buckwheat, and yellow-eyed grass.

Typical plants found surrounding ponds and the shoreline of creeks include panicums, arrowheads, and rushes. Still waters may be covered with plants such as waterlillies. Other ecological associations present include the Sand Pine and the Open Grassland/Shrubland. Some of the dominant plants include sunflower (*Asteraceae*), milkweed (*Asclepiadaceae*), sedge (*Cyperaceae*), heath (*Ericaceae*), pea (*Fabaceae*), grass (*Poaceae* or *Gramineae*), buckwheat (*Polygonaceae*) and the yellow-eyed grass (*Xyridaceae*) families.

The wildlife of the Sandhill Ecological Association consists of a variety of amphibians, reptiles, birds, and mammals. Representative amphibians include the central newt and the barking treefrog. Reptiles present may include the gray rat snake, coral snake, gopher tortoises, and box turtles. Armadillos, several types of squirrels, and the raccoon live in the sandhills along with the feral pig and the white-tailed deer. The gray fox and bobcat are characteristic predators in the sandhills, and the Florida black bear is known to frequent this ecological association.

The great horned owl, red-shouldered hawk, and the screech owl are raptors living and hunting in the woodlands. Along clearings and woodland edges, the southeastern American kestrel preys on small rodents, reptiles, and insects. The sandhill upland lakes provide feeding areas for wading birds. Warblers, the red-cockaded woodpecker, vireos, and the Bachman's sparrow are other indigenous birds found within the Sandhill Ecological Association. Within the streams of the sandhills are found many different aquatic animals. Crustaceans, burrowing worms, and other benthic and pelagic organisms are endemic to most freshwater bodies. Fish species include rock bass, largemouth bass, blackbanded and brown darters, and the Okaloosa darter.

Many neotropical migrant birds use the sandhills as breeding grounds in the summer. Riparian areas and bottomland hardwood swamps associated with major drainages areas provide the most important habitat for them. Riparian areas are those terrestrial areas along the banks of freshwater bodies, watercourses, and surface-emergent aquifers. Table D 1 lists the plant and animal species commonly found in the Sandhill Ecological Association.

Table D 1. Plant and Animal Species Typically Found In Ecological Associations under Tyndall MOAs

Plants		Animals	
Common Name	Scientific Name	Common Name	Scientific Name
Sandhills Ecological Association			
Long Leaf Pine	*Pinus palustris*	Red-cockaded Woodpecker (FE, SE)	*Picoides borealis*
Turkey Oak	*Quercus laevis*	Bobwhite Quail	*Colinus virginianus*
Blackjack Oak	*Q. marilandica*	Great Horned Owl	*Bubo virginianus*
Bluejack Oak	*Q. incana*	Gopher Tortoise (UR, ST)	*Gopherus polyphemus*
Wiregrass	*Aristida stricta*	Eastern Indigo Snake (FT, ST)	*Drymarchon couperi*
Saw Palmetto	*Serona repens*	Diamondback Rattlesnake	*Crotalus adamanteus*
Bracken Fern	*Pteridium aquilinum*	Six-lined Racerunner	*Cnemidophorus sexlineatus*
Blueberry	*Vaccinium spp.*	Florida Black Bear (ST)	*Ursus americanus floridanus*
Yaupon	*Ilex vomitoria*	Fox Squirrel	*Sciurus niger*
Gallberry	*Ilex glabra*	Least Shrew	*Cryptodus parva*
Gopher Apple	*Licania michauxii*	Cottontail Rabbit	*Sylvilagus floridanus*
Blackberry	*Rubus cuneifolius*	Pocket Gopher	*Geomys pinetus*
Sand Pine	*Pinus Clausa*	White-tailed Deer	*Castor canadensis*
Pine-woods Bluestem	*Andropogon arctatus*	Feral Pig	*Sus scrofa*
Wiregrass	*Aristida stricta*	Raccoon	*Procyon lotor*
Open Grassland/Shrubland Ecological Association			
Switchgrass	*Panicum virgatum*	Red-shouldered Hawk	*Buteo lineatus*
Broomsedge	*Andropogon virginicus*	Southeastern American Kestrel (FSC, ST)	*Falco sparverius paulus*
Big Bluestem	*Schizachyrium spp.*	Florida Burrowing Owl	*Athene cunicularia*
Yellow Indian Grass	*Sorghastrum spp.*	Flycatchers	*Tyrannidae spp.*
Purple Lovegrass	*Eragrostis spectabilis*	Cotton Mouse	*Peromyscus gossypinus*
Woolly Panicum	*spp.*	Slender Glass Lizard	*Ophisaurus attenuatus*
Forbs	*Panicum virgatum*	Gopher Tortoise (UR, ST)	*Gopherus polyphemus*
Sand Pine Ecological Association			
Sand Pine	*Pinus Clausa*	White-tailed Deer	*Castor canadensis*
Pine-woods Bluestem	*Andropogon arctatus*	Feral Pig	*Sus scrofa*
Wiregrass	*Aristida stricta*	Raccoon	*Procyon lotor*
Saw Palmetto	*Serona repens*	Gopher Tortoise (UR, ST)	*Gopherus polyphemus*
Gopher Apple	*Licania michauxii*	Diamondback Rattlesnake	*Crotalus adamanteus*
Bracken Fern	*Pteridium aquilinum*	Pileated Woodpecker	*Dryocopus pileatus*
Blackberry	*Rubus cuneifolius*	Pine Siskin	*Carduelis pinus*
Flatwoods Ecological Association			
Longleaf Pine	*Pinus palustris*	Wood Duck	*Aix sponsa*
Runner Oak	*Quercus pumila*	Red-winged Blackbird	*Agelaius phoenicius*
Saw Palmetto	*Serona repens*	Cotton Mouth	*Agkistridon piscivorus*
St. John's Wort	*Hypericum brachyphyllum*	Reticulated (FE, SE) and Frosted (FT, ST) Flatwoods Salamander	*Ambystoma bishopi* *Ambystoma cingulatum*
Slash Pine	*Pinus elliottii*	River Otter	*Lutra canadensis*
Black Titi	*Cliftonia monophylla*	Beaver	*Castor canadensis*
Milkweed	*Asclepias humistrata*	Florida Black Bear (ST)	*Ursus americanus floridanus*
Pitcherplant	*Sarracenia spp.*	Gray Fox	*Urocyon cinereoargenteus*

Plants		Animals	
Common Name	Scientific Name	Common Name	Scientific Name
Swamp Ecological Association			
Yellow Water Lilly	*spp.*	Raccoon	*Procyon lotor*
Saw Grass	*Cladium jamaicensis*	Florida Black Bear (ST)	*Ursus americanus floridanus*
Cattail	*Typha domingensis*	Sherman's Fox Squirrel (SSC)	*Sciuris niger shermani*
Phragmites	*Phragmites australis*	American Alligator (FT (S/A), SSC)	*Alligator mississippiensis*
White Cedar	*Chamaecyparis thyoides*	Pine Barrens Tree Frog	*Hyla andersonii*
Water Tupelo	*Nyssa biflora*	Five-lined Skink	*Eumeces fasciatus*
Pitcher Plant	*Sarracenis purpurea*	Green Anole	*Anolis carolinensis*
Red Titi	*Cyrilla racemiflora*	Garter Snake	*Thamnophis sirtalis*
Tulip Poplar	*Liriodendrom tulipifera*	Eastern Indigo Snake (FT, ST)	*Drymarchon couperi*
Sweet Bay Magnolia	*Magnolia virginiana*	American Beaver	*Castor canadensis*
Red Bay	*Persea borbonia*	Parula Warbler	*Parula americana*
Salt Marsh Ecological Association			
Black Needle Rush	*Juncus roemerianus*	Periwinkles	*Littorina irrorata*
Salt Marsh Cordgrass	*Spartina alterniflora*	Oyster	*Crassostrea virginica*
Salt Meadow Hay	*Spartina patens*	Gulf Crab	*Calinectes smilis*
Seaside Elder	*Iva imbricata*	Long-nosed Killifish	*Fundulus similis*
Saltgrass	*Distichylis spicata*	Sheepshead Minnow	*Cyprinodon variegatus*
Wax Myrtle	*Myrica certifera*	American Alligator (FT (S/A), SSC)	*Alligator mississippiensis*
Yaupon Holly	*Ilex vomitoria*	Great Blue Heron	*Ardea herodias*
Cattail	*Typha angustifolia*	Belted Kingfisher	*Megaceryle alcyon*
Palmetto	*Serenoa repens*	Raccoon	*Procyon lotor*
Marsh Elder	*Iva frutescens*	Salt Marsh Rabbit	*Sylvilagus aquaticus*
Coastal Strand Ecological Association			
Sea Oats	*Uniola Paniculata*	Ghost Crab	*Ocypode quadratus*
Bitter Panicum	*Panicum amarum*	Least Tern (FE, ST)	*Sterna albifrons*
Sea Rocket	*Cakile constricta*	Loggerhead Sea Turtle (FT, ST)	*Caretta caretta*
Beach Morning Glory	*Ipomoea stolonifera*	Shorebirds	*Several genera & species*
Bluestem	*Schizachryrium maritimum*	Raccoon	*Procyon lotor*
Woody Goldenrod	*Chrysoma pauciflosculа*	Beach Mouse	*Peromyscus polionotus sbspp.*
Beach Rosemary	*Ceratiola ericoides*	Six-lined Racerunner	*Cnemidophorus sexlineatus*
Sand Live Oak	*Quercus geminata*	Pygmy Rattlesnake	*Sistrurus miliarius*
Magnolia	*Magnolia grandiflora*	Black Racer	*Coluber constrictor*
Yaupon Holly	*Ilex vomitoria*	Fox	*Vulpes vulpes*
Slash Pine	*Pinus ellittii*	Cotton Rat	*Sigmodon hispidus*
Sand Pine	*P. clausa*	Opossum	*Didelphis virginiana*
Saw Palmetto	*Sernoa repens*	Eastern Mole	*Scalopus aquaticus*

Key:

CH = Critical Habitat designated
FE = Federally Endangered
FT = Federally Threatened
FT (S/A) = Federally Threatened by Similarity of Appearance
FSC = Federal Species of Concern
UR = Under Review by USFWS
SE = State Endangered
ST = State Threatened
SSC = State Special Species of Concern

D.2 Open Grassland/Shrubland Ecological Association

The Open Grassland/Shrubland Association occurs on heavily disturbed Sandhill, Flatwoods, and Swamp ecological association sites. Some of the species found within this association include switchgrass, broomsedge, bluestem, lovegrass, and woolly panicum. Riparian zones are found throughout these areas. Table D 1 lists the plant and animal species commonly found in the Sandhill Ecological Association.

D.3 Sand Pine Ecological Association

The excessively drained, thick sands of the Lakeland Association underlie the topography of the Sand Pine Ecological Association, with areas of gently sloping narrow ridges with steep side slopes. The Sand Pine Ecological Association is comprised of a dense, closed canopy stand of sand pines with low species diversity. The two main communities are the sand pine and the xeric hammock. The ground cover is generally sparse, and includes ground lichens, grasses, and herbs.

Wildlife observed include the white-tailed deer, feral pig, raccoon, gopher tortoise, and eastern diamondback rattlesnake. Birds found within this association include the pileated woodpecker, white-breasted nuthatch, and pine siskin. Table D 1 notes some of the species typically found in the Sand Pine ecological association.

D.4 Flatwoods Ecological Association

The Flatwoods Ecological Association contains seven separate plant communities. This association is located on gently sloping topography. An example is the wet flatwoods community, located in low-laying areas adjacent to rivers and the swamp ecological association. In this community, water may stand for a month or longer during the rainy season. Southern milkweed, the white-top and sweet pitcherplant, Chapman's butterwort, and Curtiss' sandgrass are rare plants that may be found in this association.

The wet flatwoods community provides habitat for a variety of aquatic birds such as wood ducks, the red-winged blackbird, and neotropical migrants. The black racer and cottonmouth snakes are common reptiles, while typical amphibians include the Alabama waterdog and the flatwoods salamander. Mammals present may include the river otter, beaver, gray fox, several types of squirrels, and the Florida black bear. The creeks and ponds support several fish species including the speckled madtom, weed shiner, and starhead top minnow. Table D 1 shows the plants and animals typically found within the Flatwoods association.

D.5 Swamp Ecological Association

The Swamp Ecological Association consists of flat, poorly drained soils and maintains vegetation characteristic of wet environments which can include floodplain forest, floodplain swamp, bottomland forest, wet prairie, hydric hammock, blackwater stream, marsh lake, and bogs.

Due to the variety of habitats found within this association there are many different types of wildlife. The opossum, bear, otter, and beaver are common mammals, while the green anole,

Alabama waterdog, dwarf salamander, cottonmouth, and American alligator are representative amphibians and reptiles.

Riparian areas and bottomland hardwood swamps are associated with major drainage areas and provide important habitat for neotropical migrants. Shallow riparian habitats provide fish for belted kingfishers, while marshes are home to the great blue heron, black-crowned heron, and northern harrier. Table D 1 provides a list of species found in the Swamp association.

D.6 Salt Marsh Ecological Association

Salt marshes are present on tidal-influenced, level areas. Soils that are commonly found in these areas are very poorly drained muck or sandy clay loams underlain by loamy sand or organic soils, which are in turn underlain by clay or sand. Tidal action causes saturation of the soil by salt water and inundation to a depth of a few inches. The salt marsh is highly productive, with nutrient systems being mainly detritus dominated. The salt marsh ecosystem acts as a nursery for many estuarine and marine species, with the tidal subsidy of energy and nutrients allowing for greater plant growth and animal interactions.

The vegetation within the salt marsh ecosystem occurs in distinct zones. This distribution is the result of changing water levels and salinity concentration fluctuations in both the water and the soils. Since very few plants can adjust to both the anaerobic nature of the sediments and the high salt content of the water, species diversity is very low in the salt marsh. Salt marshes along the Gulf Coast are dominated by black needle rush (*Juncus roemarianus*) and saltmarsh cordgrass (*Spartina alterniflora*). The submerged surfaces of these plants are covered with "aufwuchs", a community consisting of microalgae, bacteria, and protozoans that enhance the filtration of the water as it moves around the marsh vegetation. Much of the plant material and organic particles trapped by the marsh are compacted into peat.

There are both transient and resident species of wildlife that are supported by the salt marsh ecosystem. For transient fish and crustaceans, the salt marsh acts as a refuge from predators during the juvenile stage. Other transient species include large predators that come into the marsh with the tides to feed. Many of the resident organisms feed on the aufwuchs, while fiddler crabs find sandy patches where they can feed on microalgae. The main resident predators of the saltmarsh include the blue and Gulf crabs, which feed on small fishes and dead animals. Over 60 species of birds are known to use salt marsh habitats, with only a few being residents. Some mammals, both transient and resident, may include the marsh rabbit, the cotton rat, and bobcat. Table D 1 provides a list of some of the species usually found in the salt marsh ecosystem.

D.7 Coastal Strand

The beach and barrier island habitats are often referred to as the coastal strand. The soils of the coastal strand consist of sands grading from unsorted to finely graded and sorted grain sizes. Redistribution of these sands by wind creates dunes, which are inhabited by plants that catch sand and stabilize the dune system. Beaches and barrier islands can be broken down into zones: the surf zone, where the waves crash on the beach; the beach itself; the primary dune system, which is the first set of dunes to occur; the secondary dune system; the swale, which occurs in the washout areas between the dunes; and the maritime forest. In the case of barrier

islands, the maritime forest can also be followed by fringing marshes as the transition is again made to the back bay or sound where vegetation and wildlife resemble that of the salt marsh habitat.

Dune and beach vegetation can be broken down into three distinguishable zones: shifting beach sands, produne vegetation, and scrub. The shifting beach sand zone is devoid of living, rooted vegetation, and consists of seagrasses and other drifting plant debris that is washed on shore, collectively called seawrack. The produne zone is inland of the shifting beach sand zone, and is the first system of large dunes. Vegetation here is inhabited by pioneer plants that establish themselves in the shifting sands and salt spray. Dune plants may consist of sea oats, beach morning glory, and sea purslane among others. Inland from the produne zone is the "scrub" zone. Vegetation here is usually stunted and wind/salt sprayed, consisting of shrubs, small scrubby oaks, and other small evergreens. Inland scrub forest communities are usually dominated by a mixture of sand and slash pine.

Most of the wildlife found in these ecosystems occurs beyond the primary dune system due to hot, arid climate of the beach face and primary dunes. Reptiles are abundant in these environments. Typical reptiles found here include the black racer, the six-lined racerunner, and the pygmy rattlesnake. Mammals of the coastal strand include a number of beach mice, the cotton rat, the fox, and the raccoon. The coastal strand is also habitat for many shorebirds and gulls as well as a layover for many transitory migrant species. Table D 1 lists some of the animal species commonly found inhabiting the coastal strand.

ACRONYMS AND ABBREVIATIONS

kV	Kilovolt
kWh	Kilowatt Hour
LBP	Lead-Based Paint
L_{cdn}	C-Weighted Day-Night Average Sound Level
L_{dn}	Day-Night Average Sound Levels
L_{dnmr}	Onset-Rate Adjusted Monthly Day-Night Average Sound Level
LEED	Leader in Energy and Environmental Design
LLA	Low Level Area
L_{max}	Maximum Sound Level
LO/CR	Low Observable/Composite Repair
LOA	Letter of Agreement
LODA	Live Ordnance Departure Area
LOLA	Live Ordnance Loading Area
LQG	Large Quantity Generator
LRSW	Long Range Standoff Weapons
m^2	Square Meters
MA	Million Years Ago
MAC	Munitions Assembly Conveyor
MBTA	Migratory Bird Treaty Act
MC	Munitions Constituents
mcf	Thousand Cubic Feet
MGD	Million Gallons per Day
MILCON	Military Construction
MJU	Multi Jettison Unit
mm	Millimeter
MMPA	Marine Mammal Protection Act
MMRP	Military Munitions Response Program
MOA	Military Operations Area
MOGAS	Motor Gasoline
MOU	Memorandum of Understanding
MPA	Marine Protected Area
MR_NMAP	Military Operations Area (MOA)-Range NOISEMAP
MRSP	Mobility Readiness Spare Package
MRU	Military Radar Unit
MSA	Munitions Storage Area
MSGP	Multi-Sector Generic Permit
MSL	Mean Sea Level
MTR	Military Training Route
MX	Maintenance
N/A	Not Applicable
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NAS	National Airspace System
NBCT	National Board Certified Teachers
NCO	Non-Commissioned Officer
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act
NEXRAD	Next Generation Radar
NF	National Forest
NHPA	National Historic Preservation Act
NIOSH	National Institute of Occupational Safety and Health
NLR	Noise Level Reduction
nm	nautical miles
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NODE	Navy OPAREA Density Estimates
NOI	Notice of Intent
NOTAM	Notice to Airmen
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Center
NRHP	National Register of Historic Places
NSR	New Source Review
NTTR	Nevada Test and Training Range
NWI	National Wetlands Inventory
NWFWMD	Northwest Florida Water Management District
NWR	National Wildlife Refuge
O&M	Operations and Maintenance
O_3	Ozone
OSHA	Occupational Safety and Health Administration
PAA	Primary Aircraft Authorized
Pb	Lead
PEA	Programmatic Environmental Assessment
PFCs	Perfluorocarbons
PFN	Panama City, Bay County International Airport
PHL	Potential Hearing Loss
PK	Pre-Kindergarten
PL	Public Law
PM_{10}	Particulate Matter Less Than 10 Microns in Diameter
$PM_{2.5}$	Particulate Matter Less Than 2.5 Microns in Diameter
POV	Privately Owned Vehicle
ppb	Parts per Billion
ppm	Parts per Million
PSD	Prevention of Significant Deterioration
psf	Pounds per Square Foot
psi	pounds per square inch
psig	pounds per square inch gauge
Q-D	Quantity-Distance
RA	Restricted Area
RAPCON	Radar Approach Control
re 1 μPa^2-s	Referenced to One Squared Micropascal-Second
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	Region of Influence
SB-ESG	Strategic Basing Executive Steering Group
SDB	Small Diameter Bomb
SEAD	Suppression of Enemy Air Defenses
SEL	Sound Exposure Level
SF	Square Feet
SF_6	Sulfur Hexafluoride
SFO	Simulated Flame Out Procedures
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SLUCM	Standard Land Use Coding Manual
sm	Statute Mile
SMP	Site Management Plan
SO_2	Sulfur Dioxide
SP	State Park
SPCCP	Spill Prevention, Control, and Countermeasures Plan
SUA	Special Use Airspace
SWPPP	Storm Water Pollution Prevention Plan
TPY	Tons per Year
TSP	Total Suspended Particulate
U.S.	United States
USC	United States Code
UTBNI	Up To But Not Including
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USC	United States code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordnance
VFR	Visual Flight Rules
Virginia Tech	Virginia Polytechnic Institute and State University
VOC	Volatile Organic Compounds
WMA	Wildlife Management Area
WWII	World War II

ACRONYMS AND ABBREVIATIONS START ON THE INSIDE OF THE FRONT COVER